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ABSTRACT
These conference proceedings contain two major papers. The paper by Susan S. Stodolsky and Gerald S. Lesser, "Learning Patterns in the Disadvantaged," reports a study of effects of social class and ethnic group influences on levels and patterns of mental ability. Scores for verbal ability, reasoning, number facility, and space conceptualization of middle- and lower-class Chinese, Jewish, Negro, and Puerto Rican first graders showed striking effects of ethnicity. Also noted was the fact that social class was a more influential factor in the level of ability of Negroes than among any other group. The presentation by Herbert G. Birch, "Health and the Education of Socially Disadvantaged Children," points out that the poor health of these children is a primary variable in their educational failure. Health factors which are specifically related to intellectual and educational deficits are prematurity, obstetrical and perinatal complications, birth weight, maternal physical characteristics and nutrition, and prenatal care. For an abstract of Stodolsky and Lesser, see ED 012 291; for Birch, see ED 013 283. (NH)

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CONFERENCE PROCEEDINGS

CONFERENCE ON BIO-SOCIAL FACTORS IN THE DEVELOPMENT AND LEARNING OF DISADVANTAGED CHILDREN

April 19-21, 1967

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CONFERENCE PROCEEDINGS

CONFERENCE ON BIO-SOCIAL FACTORS IN THE DEVELOPMENT AND LEARNING OF DISADVANTAGED CHILDREN*

April 19-21, 1967

Syracuse, New York

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* This Conference was held under the terms of U.S. Office of Education Contract No. 6-10-243 (Project on Stimulation and Development of Research Related to the Education of the Disadvantaged and/or Segregated). Dr. Edmund W. Gordon, Professor and Chairman of the Department of Educational Psychology and Guidance at Yeshiva University's Ferkauf Graduate School of Humanities and Social Sciences, was Project Director.

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By Herbert G. Birch

E. Discussion Following the Birch Report.

A

INTRODUCTION

POVERTY INDUCED BEHAVIORAL SEQUELAE AND ANTI-POVERTY PROGRAMS OF REMEDIATION

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Contemporary research provides evidence of a variety of behaviors and conditions which are encountered in children from economically disadvantaged backgrounds with sufficient frequency to justify the conclusion that they are either induced by or nurtured by conditions of poverty.

The excellent studies by Knobloch and Pasamanick of the relationships between health status and school adjustment, in low-income Negro children in Baltimore, by Lashof of health status and services in Chicago's south side, by Birch of health status and related learning patterns in an entire age group of school children in Aberdeen, Scotland, also of the health status of children from indigent families in the Caribbean area, and by Porter and others of the health status of samples drawn from the Head Start population provide mounting evidence in support of the hypothesis that there exists a continuum of reproductive errors and developmental defects significantly influenced by level of income. According to this hypothesis the incidence of reproductive error or developmental defect occurs along a continuum in which the incidence of error or defect is greatest in the population for which medical, nutritional and child care are poorest and the incidence least where such care is best.

These studies point clearly to the facts that:

(1) nutritional resources for the mother-to-be, the pregnant mother and fetus, and the child she bears are inadequate;

(2) except for the Aberdeen population studied by Birch, medical care--prenatal, obstetrical and postnatal is generally poor;

(3) the incidence of subtle to more severe neurologic defects is relatively high in low-income children;

(4) case finding, lacking systematic procedures, is hit or miss, leaving the child not only handicapped by the disorder but frequently with no official awareness that the condition exists;

(5) family resources and sophistication insufficient to provide the remedial and/or compensatory supports which can spell the difference between handicap and competent function.

These health-related conditions are thought to have important implications for school and general social adjustment. We know that impaired health or organic dysfunction influences school attendance, learning efficiency, developmental rate, personality development, etc. Pasamanick attributes a substantial portion of the behavior disorders noted in this population to the high incidence of subtle neurologic disorders. Silver relates a variety of specific learning disabilities to mild to severe neurologic abnormalities in children. Lustman and Greenberg have noted the relationship between frequent or chronic illnesses and poor school achievement. Clearly, adequacy of health status and adequacy of health care in our society is influenced by adequacy of income, heading to the obvious conclusion that poverty results in a number of conditions directly referrable to health and indirectly to development in general.

Etiologic relationships between income and intellectual status or intellectual function are not as readily established as those between health status and income. Yet, there is an overwhelming body of correlational data which shows income level to be the best single predictor of group intellectual function. The Sexton study of the relationship of income level to educational opportunity and achievement in a United States metropolis, the Silverman study of income and reading level, and to some extent the recently released national study of Equality of Educational Opportunity in the United States by Coleman, et al, call our attention to the fact that regardless of other variables along which the population may be grouped, poor people in this country do less well than do rich people on tests of intelligence and academic achievement. I repeat, these correlational data may not be used to establish causation, yet, shifts in group and individual scores as living standards improve or as stimulational circumstances are enhanced, as well as the fact of overlap in scores between subjects in the extremes of these two groups, lend support to the assumption that biological factors incidentally associated with income groups or directly associated with ethnic stock are insufficient to account for the observed differential function. When we look at studies of quality of educational input and the distribution of such inputs along levels of economic status we begin to find compelling evidence in support of the assumption that differential intellectual function is influenced by quality of educational exposure which in turn is influenced by income level, with poverty being positively associated with low level function as well as low level quality of education.

A rich literature has developed around the nature of this differential in intellectual function. Earlier works stressed gross quantitative differences. More recently, studies by Deutsch, Lesser, Siller, Anastasi, Hilliard, Gordon, and others have given greater attention to specific aspects of intellectual function as they differ across groups. These findings remain insufficiently developed but tend to show children from low-income families performing more poorly than their more privileged age mates on tasks which favor abstract over concrete mental processes, which favor verbal over performance responses, on tasks which require that concept formation flow from the form of the stimulus rather than from its content, on tasks which require sustained attention and involvement and more poorly on tasks which require elaborated as opposed to restricted language form. Several attempts have been made at identifying or explaining the roots of these behavioral differences from what we know about the life experiences and conditions associated with poverty. Conclusions so far advanced continue to be more speculative than empirically derived. However, the frequency with which these patterns of intellectual functions are encountered and the logical relationships which seem to prevail between certain patterns and certain life conditions, make it entirely appropriate that educational and social planning for many such poverty stricken children be influenced by these as yet tentative conclusions.

Attempts at the identification of social-affective behaviors which are associated with conditions of poverty in children have yielded rather tenuous results. This is in part due to the fact that the measurement of social and affective behaviors is still poorly developed. It is also due to the fact that poverty as do other conditions of life have varying and sometimes contradictory impacts on the persons subjected to them. Some attention has been given to questions of self concept with the prevailing views and some data indicative of depressed self concept resulting from conditions of poverty. Dreger and Miller (1960), Keller (1963) report self deprication in addition to low self concept as prominent tendencies in this group. Aggressive and strong competitive feelings have been reported by McKee and Leader. Ausubel and Ausubel found an excessive dependence on external as opposed to internal control, and Goff found self value and aspiration depressed. In general, investigators as well as less formal observers agree that level and quality of motivation are impaired by conditions of poverty and low status. The extent to which these several traits may be attributed to conditions of poverty is questionable. Existing studies do not permit the separation of the impact of poverty from the impact of ethnic caste status or social class status and their resultant imposed roles. In addition, the problem of overlap of characteristics between groups all along the economic ladder compounds the question. We also have not dealt with the fact that resistance, rebellion, indignation and personal dignity born of their expression may also be considered to be behavioral products of poverty.

We have then at least three areas of function which appear to be significantly influenced by conditions of poverty, i.e. health status, intellectual function and personal social adjustment. In each area, correlational studies show a positive relationship between low income and less than optimal condition. Despite the fairly wide discussion of these findings and their colloquial acceptance by many workers in this field, it is remarkably tragic that the emerging programs of remediation and compensation have given so little attention to these factors in the design of their attack.

In the area of health service where we probably know most about prevention and treatment, it is only within the last few months that financial resources have been made available to begin to meet the health needs of indigent children. Out of deference to the AMA, that trade union that tries to masquerade as a professional society, this nation has trailed many less wealthy countries in providing for the medical care of its people. The school health examination is a disgrace to the professions of medicine and education and the development of public school medicine as a subspecialty in pediatrics is barely on the horizon. Yet it is clear that the school functioning of many of our children, particularly those coming from conditions of poverty, could be greatly enhanced by the application of concepts from modern medicine to some of their school adjustment problems. It is interesting that in more than 300 programs for the disadvantaged reviewed in a study we have just completed, there is not one that has a well developed modern public health component, despite the fact that it is common knowledge that health problems plague the poor.

But let us not be smug in criticizing the "real doctors." Those of us who hold doctorates in psychology and education have not done better than our colleagues with medical degrees. With all the attention we have given to identifying the special characteristics of the children of the poor and with our increasing knowledge of the patterns of intellectual and social functioning thought to be peculiar to many of them, there are few if any programs which are based upon the careful qualitative analysis of the functioning of these children and none that we have been able to find where such a qualitative analysis leads to a considered prescription for educational and social remediation. With all of our knowledge of individual differences and differential psychology, our clinical work remains dominated by concern with the quantification of behavioral measures and their classification in diagnostic categories, and our remedial work is characterized by dilution for those thought too slow to keep up or enrichment for those who are assumed to have correctable deficits. We have not applied our tradition or experimentation to the learning problems of this population. We have not brought the full impact of our knowledge of the teaching-learning process to bear on the challenge of the inefficient learner. We have not assumed the responsibility for the success of their learning experience but have continued to place the burden of proof on the shoulders of the learner.

In programs of compensatory education all across the country, psychologists are prominently displayed. But aside from traditional approaches to assessment and counseling,we cannot determine how we earn our fees or salaries. The growing edges of psychology are not represented in these programs. There are obviously a few exceptions as is evidenced by the work of Cynthia and Martin Deutsch, Irwin Katz, Carl Bereiter, Susan Gray, Arthur Jensen, Frank Riessman, and Arthur Perl. But these people tend to be identified with special programs which are not a part of the mainstream public school establishment and it is in the public school that the deadening weight of this problem is carried.

Recent years have seen a flurry of effort and more money than we know how to appropriately use directed at improving the lot of the disadvantaged. This is as it should be. If we do not permit the mistaken War on Vietnam to snuff out the more humane War on Poverty, even more money and effort will be assigned to this cause. The great danger is that the knowledge currently available from the behavioral sciences may not be appropriately applied while we take comfort in the thought that a great deal is being done. It may also be,and we suspect that this is the case, that the available knowledge is not sufficient to the task. There is the fact that even the best of the existing programs can claim only modest victories.

But all is not hopeless. Our society's concern with and our nation's need to salvage the human resources represented in our country's poor provide psychology and education with the challenge and the opportunity to lift these disciplines to new levels of scientific and social productivity. For the kinds of issues which must be engaged as we meet the problems of poverty take us to the heart of the problems of psychology and pedagogy at the same time that they challenge us to new levels of social responsibility as laymen and citizens.

In this conference we will be examining issues related to the health status, intellectual function, and personal social development of socially disadvantaged children. Our goal is to better understand the relationship between these characteristics and the conditions by which they are thought to be bred. The ultimate task is to plan programs of research and service designed to relieve the deleterious impact of those handicapping conditions on learning and development.

LEARNING PATTERNS IN THE DISADVANTAGED

Susan S. Stodolsky and Gerald S. Lesser

Harvard University

This paper was commissioned under United States Office of Education Contract #6-10-240 (ERIC). It was also used at the Conference on "Bio-Social Factors in the Development and Learning of Disadvantaged Children," held in Syracuse in April 1967 under the terms of United States Office of Education Contract #6-10-243.

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Learning Patterns in the Disadvantaged

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The preparation of this paper was supported in part by the Harvard Research and Development Center (Office of Education Contract OE-5-10-239) and the Conference on "Bio-Social Factors in the Development and Learning of Disadvantaged Children," directed by Edmund W. Gordon (Yeshiva University).

Dr. Stodolsky has primary responsibility for the sections on General Review of Research and New Directions for Research. Dr. Lesser supplied the Specific Case of Research and its Implications for Educational Policy. However, each author will blame the other for errors of fact or interpretation which appear anywhere throughout the paper.

Outline

I. General Review of Research.

- A. General Intelligence
- B. Diverse Mental Abilities
- C. School Achievement
- D. Laboratory Learning
- E. Other Studies of Cognitive Development
- F. A Note on Testing

II. New Directions for Research.

- A. Developmental Origins
- B. School-Based Research

III. A Specific Case of Research: Development of Mental Abilities of Children from Different Social-Class and Ethnic Groups.

- A. The Original Study
- B. A Replication Study
- C. Future Research
  - 1. Prediction of School Achievement
  - 2. Stability over Time
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- D. Implications for Educational Policy

IV. Toward a New Definition of "Disadvantaged."

The first section of this paper is a general review of the evidence dealing with learning in disadvantaged children. We then discuss some directions for future research suggested by this review, followed by a specific case of research (past and future) with some implications for educational policy. We conclude with some thoughts on the definition of "disadvantaged."

I. General Review of Research.

A review of learning patterns in the disadvantaged faces the necessity of delimiting the key concepts. 1) Which population groups shall be included in the "disadvantaged?" 2) Which constructs or variables shall we consider as relevant indicators of learning?

For the reviewing function, which is the first purpose of this paper, we will follow the usual conventions regarding the delimitation of the disadvantaged or deprived population. Typically included in this rubric are children coming from families with low socio-economic status (as measured by occupation of the breadwinner, educational attainment of the parents, income, place of residence, etc.); children from minority groups (as determined by recent immigration of families from countries outside the United States or notable lack of acculturation of groups that may have been residents for generations) and minority racial status (in particular, Negroes and Indians who have been in caste-like status in this country for generations). Also included in this population are children from rural areas that have been isolated from the mainstream of American culture. (See Havighurst, 1964.) These definitions usually have in common the element of poverty or low income in relation to the median income of Americans.

The indicators of learning we have chosen to examine fall into four classes: intelligence and mental abilities, school achievement, laboratory learning, and expressions of cognitive development deriving from stage theory. Although these constructs vary in their clear-cut relevance to educational procedures and outcomes, we believe they all contribute some important insights into the learning patterns of the disadvantaged. We shall eventually judge these approaches in light of the power of the findings for improvement of the educational experiences and progress of disadvantaged learners.

A. General Intelligence:

The performance of children from low socio-economic status and minority groups on intelligence tests has been quite well documented. Studies of intelligence test performance and social-class status have provided the broad outlines of a picture which generally fits a deficit or less-than model. Mean differences between children of high SES and low SES have been consistently found when measures of intelligence are administered. These differences are unequivocally present at age four and have occasionally been demonstrated at younger ages (Bereiter, 1965; Gray and Klaus, 1965; Pasamanick and Knobloch, 1955; Bloom, 1964).

With increases in children's age, such intelligence test differences tend to increase. Thus, there are larger mean differences in intelligence between low and high SES children in adolescence than in the early years of school. This fanning out effect and the evidence to support it has been carefully reviewed by a number of workers (Bloom, 1964; Hunt, 1961; Silverman, 1965; Gordon, 1965; Davis, 1948; Karp and Sigel, 1965; Coleman, 1966).

The nature of the tests and conditions of administration have been an object of considerable study. The hallmark work of Eells and Davis (1951) on cultural biases in intelligence tests spurred a multitude of studies which demonstrated inadequacies in the tests themselves as good samples of general intelligence in diverse populations. Factors which might influence test performance such as rapport, speed, motivation and reward conditions were also studied (e.g. see Haggard, 1954). It appears clear now that Davis and his colleagues in their attempt to develop a culture-free measure of intelligence were accepting the idea that it was in fact possible to measure innate ability independent of cultural and experiential factors. They were assuming that it would be possible to tap the genotype of intelligence, and if properly done, intelligence would in fact be a fixed stable quantity (and one randomly distributed by social class.) See Charters, 1963.)

Partly through the failure of the Davis-Eells Games and through increasing evidence from other quarters, both the belief in fixed intelligence and the notion of ridding intelligence measurement of cultural contamination have been abandoned. Now, rather than rejecting cultural effects as contaminants, it is considered more appropriate to study them and take them into account in test construction and prediction. However, the notion of culture-fair testing has been widely accepted when the interest is in making comparative statements about groups. Thus, as is exemplified in the Lesser study of mental abilities, (Lesser, Fifer, Clark, 1965) items are based on a pool of experiences common to the subject population to be studied. Conditions of administration are arranged to minimize differences in rapport, motivation and prior experiences with testing when inter-group comparisons are being made. Further, validity and reliability must be established for the relevant population. An excellent review of factors to be considered in testing minority groups is available (Deutsch *et al*., 1964).

The most important outgrowth of the work in the 1950's is changed conception of intelligence. Only a few hearty souls will now maintain that intelligence tests measure something innate, fixed and pre-determined. (Hunt, 1961, reviews these ideas.) The validity of intelligence tests for predicting school achievement cannot be doubted, but the ability or aptitude, versus achievement distinction has been attenuated. Intelligence tests must now be thought of as samples of learning based on general experiences. A child's score may be thought of as an indication of the richness of the milieu in which he functions and the extent to which he has been able to profit from the milieu. In contradistinction, school achievement tests assume deliberate instruction oriented to the outcomes measured in the tests.

We have indicated that consistent differences on general intelligence tests are found when groups of children from varying SES backgrounds are compared. Some of the determinants of such differences were explored and a new understanding of the construct of intelligence was presented. It is important to realize that the procedures for test construction and administration now recognized as essential were not consistently followed in much past research on group comparisons. With this caution in mind, we continue our review of group comparison studies by turning to those which deal with racial and ethnic groups.

Differences in intelligence test performance have been found when Negroes and whites are compared. In general, Negroes are found to have lower tested intelligence than whites when compared within social class (Dreger and Miller, 1960; Deutsch and Brown, 1964), although the difficulties of measuring social status within the Negro population for comparisons with the white population have not been adequately overcome.

Studies of other minority groups, though not nearly as plentiful as those on Negro-white comparisons, generally indicate similar mean differences. (See Anastasi, 1958, Ch. 15 for a review.)

It should be remembered that the studies we have reviewed deal only with group differences using social class, ethnicity or both as classificatory variables. Although mean differences are found in favor of majority group and high SES children, the overlap in distributions is great. It is by now a truism that all disadvantaged children do not fall below their more advantaged peers on tested intelligence and mental abilities. The deficit model applies to groups only. Individual differences within groups must also be examined.

A number of recent studies have attempted to locate and study children of disadvantaged origins who in fact are superior to the normative status of the disadvantaged. The work of Karnes (1965) and Mackler (1966) and McCabe (1964) typify these studies. These researchers are attempting to characterize successful children and to study environmental factors which may account for success in disadvantaged children. The ability of these workers to locate children who test above average on intelligence tests and who perform above grade level on achievement tests is witness to the overlap in populations of advantaged and disadvantaged children. However, it should be noted that the criteria on intelligence tests for "gifted" is typically lower than that employed with a middle-class population.

B. Diverse Mental Abilities:

Early research in sub-cultural differences attempted to demonstrate that minority-majority group differences were attributable to the verbal nature of most general intelligence tests. The results from investigations which utilized tests of a less verbal character is equivocal (Higgins and Sivers, 1958; Fowler, 1957; Stablein et al., 1961; MacCarthur and Elley, 1963). The most adequate conclusion for the moment seems to be that although group differences may be reduced somewhat by eliminating verbal components from the tests, other factors such as experiential differences, attitudes toward test taking and speed still affect test performance. And for certain groups such as Negroes, eliminating verbal items results in lower performance levels.

Coleman (1966), as part of a massive survey on equality of educational opportunity in this country, administered a verbal and non-verbal (reasoning) measure to first graders of various backgrounds. These tests were administered at the beginning of the school year. He found that children of low social status and children from minority groups (Negroes, Mexican-Americans, Puerto Ricans and American Indians) start school at grade one with mean scores on verbal and non-verbal tests of general ability that are below the national white average. The only exception to this general finding is that Oriental children score at the national average on the verbal measure at grade one and above the average on the non-verbal measure. In addition, the American Indian group sampled score at the national average on the non-verbal measure at grade one.

Aside from comparisons of verbal and non-verbal abilities, little in the way of study of other mental abilities has been systematically undertaken. Especially vacuous is such information with young subject populations. One exception is the work of Lesser, Fifer and Clark (1965) who have studied four mental abilities (Verbal, Reasoning, Number and Space) in first grade children. They compared performance of four sub-cultural groups (Negroes, Jews, Puerto Ricans and Chinese) of high and low social status, studying both organization of these abilities (patterns) as well as level of performance. This study will be described in greater detail later in this paper; it speaks to a much-needed area of investigation.

The organization of mental abilities in disadvantaged groups as studied through factor analysis has received relatively little attention. Recent work by Lovinger _et al_. (1966) with junior high school students, and Semler and Iscoe (1966) with elementary school children make an important contribution. Lovinger found that a factor analysis of the WISC responses of Negro lower-class seventh graders produced a factor structure which was congruent with that found for the normative group (Cohen, 1959), although level of performance on the WISC was considerably lower for his population and subtest scores were also variable. Semler and Iscoe (1966) administered the WISC and Progressive Matrices to white and Negro children from seven to nine years of age. They found sufficient incongruity in the intercorrelations of the WISC subtests by race to warrant separate factor analyses. Intercorrelations among the Progressive Matrices subtests, however, were highly similar for both groups.

It should be clear from this review, that much data is available for purposes of comparing social class groups on tests of general intelligence. However, even when one wants to make more detailed analyses either by minority group membership or on particular mental abilities the data become sparse. In addition, data on the organization of mental abilities within sub-groups is just becoming available. Testing of the same samples on a number of mental abilities (such as the PMA) has only been done occasionally (Havighurst and Breese, 1947; Havighurst and Janke, 1944; Lesser et al., 1965).

C. School Achievement:

We turn now to studies of school achievement in disadvantaged groups. Massive amounts of data are now available on a national sample of children at grades one, three, six, nine and twelve in regard to school achievement (Coleman, 1966). The findings from this study are consistent with earlier ones dealing with the school achievement of disadvantaged children. In the Coleman survey in addition to a general verbal and non-verbal measure at each grade level, reading and mathematics achievement were assessed at all grades starting at grade 3 and a General Information test was administered at grades nine and twelve.

As indicated in the last section, most groups of minority children and those of low SES score below the national average on verbal and non-verbal tests at the beginning of their school careers (Coleman, 1966). In addition, readiness tests* administered to children at the kindergarten level have also found indications of social class and racial differences in readiness, in favor of majority group and high SES groups. This has been demonstrated with reading readiness (Brazziel and Terrell, 1962) and arithmetic readiness (Montague, 1964).

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*The readiness tests, as opposed to the general ability tests, are more specifically oriented to learnings necessary for successful achievement of a school subject e.g. reading. In fact, predictive validities of the two types of tests do not differ appreciably.

Rather than witnessing a narrowing of the differences as children proceed through school, the Coleman (1966) findings reveal that minority group children (with the Orientals excepted at grade 3) perform below the national average at all grade levels on all measures. The relative standing of these groups in relation to the white population remains essentially constant in terms of standard deviations, but the absolute differences in terms of grade level discrepancies increases. This increase in the number of grade levels behind the normative population is what is commonly referred to as the "cumulative deficit" (Deutsch, 1960).

Contrary to what might have been expected regarding the differentials in mathematics and reading achievement, the absolute grade level difference (compared to the average white group) in achievement in mathematics at grade twelve for all groups except the Orientals is greater than for reading comprehension (Coleman, 1966).

The Coleman survey is cross-sectional. There are a few longitudinal studies of achievement in the literature which reflect essentially the same pattern: as disadvantaged children move through the current school system their achievement in grade levels as compared to the normative population becomes increasingly discrepant and low (Osborne, 1960).

The picture of educational disadvantage which emerges when examining achievement data is a clear indication of the failure of the school systems.

When intelligence test data and early achievement data are combined, we have a predictor's paradise, but an abysmal prognosis for most children who enter the school system from disadvantaged backgrounds. At the very least this ability to predict school failure should be better exploited by the schools in an effort to remediate the situation. Payne (1963) has demonstrated that by the end of grade one, over two-thirds of the children who will be failing in arithmetic in grade six can be identified using socio-economic data, intelligence test scores and an arithmetic achievement test. This provides the school not with group tendencies but with individual tagging of children for whom the usual curriculum will surely fail. It also provides five years of lead time to remedy the situation.

Taken together, the data on general intelligence, mental abilities and school achievement all give indications that general learning first in the home and community and later within the school as well is clearly associated with disadvantaged status. The level of such learning is generally lower for children of most minority groups and children of low socio-economic status. Important variations in patterning of such learnings has yet to be studied systematically with a few notable exceptions. Even in the school achievement area, data regarding progress in school subjects other than reading and mathematics is not readily available. It can perhaps be safely assumed that achievement in social studies, science, and other academic areas will be highly correlated with achievement in reading and arithmetic. Studies of performance of disadvantaged children in these areas should be carried out, however.

D. Laboratory Learning:

There are only a few studies which have used laboratory learning paradigms to compare performance of children from different social and cultural backgrounds. As Jensen (1967a) has pointed out, it is somewhat inconsistent with the traditions of the learning laboratory to introduce examinations of individual difference variables. Thus, Subjects X Independent Variables interactions are usually considered to contribute to error variance (Jensen, 1967a, p. 117).

Semler and Iscoe (1963) compared the performance of Negro and white children on four conditions of paired associate learning tasks; they also obtained WISC's on the children who ranged in age from five to nine years. Although significant differences on the WISC were present, overall racial differences in paired-associate learning were not found. Correlations between IQ and learning task scores were low for both groups (.094 for whites, .189 for Negroes).

Zigler and DeLabry (1962) compared groups of middle-class, lower-class and retarded subjects on a concept switching task using different reward conditions. They found that when each group performed under the reward condition considered optimal, there were no group differences in performance. The intangible reward condition was considered optimal for the middle class, tangible reinforcement was optimal for the lower-class group and the retardates. A similar study using a discrimination task was carried out by Terrell, Durkin and Wiesley (1959). They also found material reward produced better performance in lower-class children and non-material reward proved more effective with middle-class children.

Rohwer (1966), Jensen (1961) and Rapier (1966) have found that performance of lower- and middle-class Negroes, Mexican-American and Anglo-Americans, and lower- and middle-class Caucasians, respectively, does not differ markedly in laboratory learning tasks such as selective trial and error learning and paired-associate learning. These workers find that the relationship between tested intelligence and performance on the learning tasks is high for the upper-status groups but negligible for the lower-status groups. Jensen (1967b) suggests that the equivalence of performance of the lower-status children with middle-class children on these tasks which do not require transfer from previous learning suggests that the learning ability of children from lower-status backgrounds is not adequately reflected in general intelligence tests. Taken together with the findings of high correlations on these learning tasks and intelligence tests for upper-status groups, and low correlations for low status groups, he argues that research is needed to clarify the reasons for these unique relationships which probably reflect that intelligence tests are "truer" estimates of ability for the middle-class groups than for the lower class.

Whether one wishes to join Jensen in his search for more accurate measurements of ability in low status populations -- it is admittedly reminiscent of the quest for culture free measurement -- his findings and those of his colleagues suggest the relevance of combining differential psychology with the tools of the learning laboratory. Fruitful exchange of knowledge may be possible and help to edify the learning patterns of the disadvantaged.

Along these lines, some recent factor analytic studies have been carried out with measures of various abilities and measures of learning on laboratory tasks. Illustrative of this work is a study by Duncanson (1966) who administered concept formation, paired associates and rote memory tasks to sixth grade students along with a number of tests from the Reference Tests for Cognitive Factors, the Kuhlman-Anderson and some of the Stanford Achievement Battery. The socio-economic level of the students sampled is not specified in this study. However, the factor analysis carried out on these data did show common variance between certain ability tests and the laboratory tasks with the exception of the concept formation tasks. In addition there were unique learning task factors. Factor analytic studies such as this one should help clarify the nature of learning task performance and ability measurements on populations of different ages and backgrounds.

E. Other Studies of Cognitive Development:

It remains to review other studies which deal with cognitive functioning but come from traditions other than the psychometric or learning laboratory. One such dimension of cognitive functioning is classificatory behavior. Classificatory behavior has often been considered a language function and has been studied along with other linguistic behaviors. Although we have not reviewed language studies in the disadvantaged, this particular aspect of functioning can be seen as exemplary of linguistic or cognitive functioning. John (1963) asked children to sort pictures of common objects and to label the piles they created; she studied first and fifth grade Negro children of varying social class. She found that children at the fifth grade level of lower-class status made more piles and gave fewer verbalizations about their sorting than middle-class children.

Hess and Shipman (1965) in presenting the Sigel Sorting Task to four year old Negro children of varying social class also found that level of abstraction was related to social class in the children, although the number of unscorable responses was extremely high for all children of this age.

Although child psychologists are showing increasing interest in the work of Piaget, few studies from a stage theoretic point of view have been executed with children from disadvantaged backgrounds. In one study a sorting task (using human and animal dolls) and a class inclusion task were administered to part of the Hess and Shipman (1963) sample when they attained age five. The tasks had been developed by Kohlberg (1965) and patterns of responses had been found to form a Guttman scale reflecting a Piaget-based developmental sequence in a middle-class sample of children. The developmental sequence was found to exist within this Negro population of mixed social class; that is, the Guttman scale was reproduced. Further, there were differences by social class in the developmental level attained, with the upper-middle-class group being more advanced developmentally. (Stodolsky, 1965).

Deutsche (1943) in a study of children's concepts of causal relations based on a Piagetian theory compared children in grades three through eight who came from different social class backgrounds. She found no consistent differences by social class in the developmental level of children's responses to her assessments of causal relations.

Wallach (1963) reports studies by Hyde and Slater dealing with conservation of number in samples of children of differing social background.

Wallach reports that these researchers have found variations in age norms in differing social groups but no indication of discrepancies in developmental sequences.

From the limited evidence to date it appears reasonable to expect that the stage theory of Piaget is generally applicable to all children regardless of social-class background. Longitudinal studies and studies at older ages would seem particularly important. The studies which have found developmental sequence to apply to diverse samples of children have been with young children. It is still not known how much of the developmental sequence is general. Thus, we might find truncated developmental sequence if we tested children of disadvantaged background in adolescence. In other words, such children might display sequence to a point, but the stage of development reached might be less developed than that achieved by their advantaged peers. Such studies should be considerably aided by the availability of standard testing techniques (Laurendeau and Pinard, 1962).

F. A Note on Testing:

The types of achievement and intelligence tests which are most often used can only have limited value in describing the cognitive functioning of children. In almost all instances we are concerned with scratchings on an answer sheet not with the ways in which a student arrived at a conclusion. No matter how much we may think we know by looking at scores on such psychometric procedures, unless they are constructed to reveal reasoning processes we simply won't get at them. Zigler (1966) in discussing mental retardation, points out this content versus process distinction. He makes a plea for testing procedures which give us information about the "cognitive structures and processes that give rise to content" (p. 113).

Historically, there has been some incompatability between test constructionists working within the measurement tradition and those psychologists interested in cognitive processes. There does not seem to be any necessary reason for this. The testing procedures developed by Smedslund (1963), Laurendeau and Pinard (1962) and a new series developed by E.T.S., "Let's Look at First Graders" are procedures which allow statements about individual differences and also provide information about cognitive processes of children. These tests are outgrowths of Piaget's theories of cognitive development.

As another example, within the achievement testing domain, more use could be made of alternative responses to problems. If multiple choice stems consisted of errors reflecting common difficulties encountered in problem solution, then analysis of all student responses would give the teacher diagnostic information. The "wrong" answers would contain within them important information about the student's path of problem solution.

II. New Directions for Research.

Although the above review of recent studies relating to learning in the disadvantaged does not pretend to be totally comprehensive, the relative emphases in prior research is likely to be veridical. Using the review as a base we will now explore the directions for new research in this area which we believe to be most necessary. There are at least two major orientations which research on the learning of disadvantaged students can take. Both seem important, but have different pay-offs in terms of relevance to educational procedure and outcomes.

A. Developmental Origins:

The first direction which can be charted is an explanatory, developmental one. This type of research would be oriented to tracing the origins of the characteristics which have been observed in the disadvantaged, as well as charting the etiology of characteristics not studied to date.

If we begin with a broad description of the relation between a characteristic such as general intelligence and social class status a series of questions can be asked. Most broadly, how can we account for the observed differences in performance among these groups? What does it mean in psychological process terms to be a member of a given social class? In order to answer this question one moves quickly to variables which are more detailed and which should explain within class variations as well as between class variation.

A start in this research direction has been made in a number of quarters. Milner (1951) assessed parent-child relations and certain attributes of the home environment in relation to reading readiness. She used interview procedures in her study of first-grade children and their parents. More recently, Davé (1963) and Wolf (1965) related indices of home environment to school achievement and intelligence test scores, respectively, in a fifth-grade white population of varying social class. These workers began by conceptualizing the home in terms of environmental process variables believed to be salient for the development of the outcome measures in which they were interested. They also used interviews to assess these environmental characteristics. They rated such characteristics as press for achievement, language models in the home, academic guidance provided by the home and provisions for general learning. The ratings which they derived on the environmental process variables were then correlated with children's performance. Davé found a multiple correlation of .80 between his environmental indices and overall achievement on a standard test battery. Wolf achieved a multiple correlation of .69 between his ratings and intelligence test performance.

From the point of view of prediction, these correlations represented a considerable advance over the usual relationship found between social class and achievement or intelligence test performance. More important, however, is the direction in which they orient future research. It is clearly demonstrated that one can move beyond gross classificatory variables such as social class to much more detailed assessment of environments. Although these studies are correlational, they move us conceptually in the direction of experimental studies of development by viewing environmental variables in dynamic, process-oriented terms.

A study reported by Peterson and DeBord (1966) investigated various home factors and their relation to achievement in eleven-year-old Negro and white lower-class boys in a southern city. Using interview procedures they assessed family composition, economic and social stability of the family, social participation, cultural level of the home, educational press, and certain aspects of the parent's orientation to the world. Peterson and DeBord ran separate multiple regressions on their data by race. For both groups they achieved high multiple correlations between certain home variables and achievement: multiple correlation for Negroes was .82 using eleven variables regressed on achievement scores; the comparable correlation for whites was .75 using fourteen home variables. Although there were certain variables which were significantly correlated for both the Negroes and whites others were unique for each group. The fact that such multiple correlations were obtained _within_ a lower-class sample indicates the extent to which home conditions vary within social-class groups.

Another important step in this direction is the research of Hess and Shipman (1965). In an extensive project studying Negro pre-school children, they have assessed numerous maternal characteristics including language (Olim, Hess and Shipman, 1965) and maternal teaching style (Jackson, Hess and Shipman, 1965). Maternal teaching style is assessed in an experimental interaction session in the laboratory in which the mother is instructed in a simple task and then instructs her child. All interactions, both verbal and physical, are recorded and later analyzed into a number of dimensions. Olim, Hess and Shipman report that maternal language is a better predictor of child's abstraction score on a sorting task than either the mother's IQ or the child's IQ. Jackson, Hess and Shipman found that certain teaching variables were highly related to the learning outcome of the child in the experimental teaching situation. In addition, Stodolsky (1965) has extended these findings to predict child's vocabulary at age five using a combination of maternal language and teaching variables assessed when the child was four. Multiple correlations of these process variables and the child's language score was .68, very close to the theoretical limits taking into account the reliability of the vocabulary test. She found that the quality of the mother's own language, the mother's use of reinforcement in a teaching situation and the extent to which the mother made task-relevant discriminations in teaching a task were highly related to the child's vocabulary level.

The Hess and Shipman work posits that the mother's behavior, especially her linguistic and teaching behavior, is a key to the child's learning in the home. By drawing on learning theory and theories of language learning, they are able to point to relations between developments in the child and the mother's behavior which are both theoretically reasonable and have great heuristic power.

The Hess and Shipman study is clearly an advance in the direction of explaining the origins of cognitive abilities in young children. Their work is more embedded in natural observation than the interview studies previously cited, but still does not go the whole way in assessment of what actually takes place in the home.

It should be clear that it will eventually be necessary to execute detailed observational studies of children in home environments if one wants to arrive at valid hypotheses about the dynamics of development in interaction with environment. The dearth of naturalistic data about children's behavior and concomitant environmental circumstances is most regrettable. Some attempts are now being made to remedy this situation at Harvard in the form of the Pre-School Project under the general direction of Burton White. This Project is planned as a long term study of pre-school children in home and school environments to trace the development of various abilities which promote educability. We are beginning with first-hand observations of children and environments. Eventually, we shall generate ideas about developmental regularities which will be tested through longitudinal studies of children from birth through six years of age. In addition we shall generate hypotheses regarding environmental factors which interact in important ways with the developmental phenomena we isolate. In the long run these hypotheses will be subject to experimental test through manipulations of environmental conditions.

In order to extend our knowledge of the development of intellectual abilities and learning in children, we will need more investment in longitudinal studies which chart the course of growth within individuals. Such studies should be accompanied by investigations of relevant environmental circumstances. The longitudinal work of Birch and his colleagues on the development of personality and temperamental characteristics in infants and young children is illustrative of the power of this approach.

The types of studies we are suggesting here clearly need not be restricted to disadvantaged populations. It is to be hoped that such researchers would include children of diverse backgrounds. From a methodological point of view, variations in environmental circumstances and variation in child characteristics would be less restricted by studying a wide range of children. On the other hand, it is altogether possible that circumstances which are relevant in one sub-cultural context would not generalize across sub-cultures.

Is this kind of research high priority for school people? In many ways, we think not. We think we should assume for the moment that the job of the schools is a limited one (however arduous and complex). Children are sent to schools for a limited part of their daily lives to learn certain knowledge and skills and ways of thinking which are considered essential for functioning in the society -- in the world of work, leisure, and as citizens. This may appear to be a reactionary position, but we do not think we can expect schools to be the major catalyst or change agent in the society. It is our opinion that a more ostrich-like approach to the learning of disadvantaged students might have salutory effects.

Is it, after all, of prime importance for the teacher to know that a given child's intelligence test performance has been influenced by his mother's language, family values toward learning and so on? What is the teacher to do with this information? Will she find out the ingredients of such behaviors in parents of successful children, and imitate them? Surely school people can do better than that! This point is not hypothetical. Much of the design of pre-school compensatory programs for example has been quite directly oriented to reproducing the conditions of the middle-class home.

If school people want to take on the job of changing home conditions, for example, changing parent-child interactions in the home, then such information becomes more relevant. But we should also like to suggest that such home-based interventions will probably not be sufficient. Let us remember that life styles are usually quite adaptive to life circumstances (Lewis, 1961). We are not suggesting that it is impossible to achieve some modification of parental behaviors to facilitate the educational progress of students, but we would probably be a lot more successful if we were to modify the conditions which probably lead to many of these behaviors: namely, lack of money and access to jobs.

Now perhaps we are talking about politically-based action research! But while we are keeping psychologists and anthropologists busy studying the characteristics of people who are poor, might it not also be advisable to assess the degree to which these characteristics are situation-dependent? We are suggesting here a rather simple experiment which seems very important. Would poor people, given jobs and money, change in their behaviors relevant to the child's educability? Would parental behaviors such as cognitive level, teaching style, values and attitudes change with a change in economic conditions? We do not know -- but we think the matter bears empirical investigation.

By pursuing this line, which may be considered a flight into fantasy, (but c.f. Moynihan, in press) we do not mean to denegate research on the processes of development in disadvantaged children. We are suggesting that heavy investment in investigations of conditions which are modifiable through political and economic actions should be tempered by knowledge of the outcomes of such changes. Further, we suggest that the type of research which is both legitimate and important for developmental psychologists is not the most direct route to solving the educational problems which the schools have to tackle right now.

B. School-Based Research:

We should like to turn now to a much more straightforward and conservative approach to the learning problems of disadvantaged children. The schools have a job to do. Ask any teacher, she knows what she is to "cover" in a term. How can researchers assist teachers in doing this job better?

First, one assumption must be made explicit. Most, if not all, teachers want to teach effectively and to see their students learn. We do not believe the cumulative deficit in achievement of disadvantaged students reflects any willful or determined attempts on the part of teachers to "keep these students down." Nor do we think it reflects laziness. The most parsimonious assumption would seem to be that teachers are not effective and students are not learning at an adequate rate because techniques have not been devised which produce desired learning outcomes in many children whom we label disadvantaged.

What can researchers do to help change this situation? One strategy would be to start where the teacher has to start: with a curriculum to be taught and a group of students who are to learn it. Two broad questions can be asked: What does it take in the way of student behaviors and attributes to begin the prescribed learning task? 2) How does the student's current state match these requirements?

I am suggesting here that we formalize that process which typically goes on in a teacher's mind. The teacher attempts at some level to analyze the objective she wants her student to achieve into a logical sequence of learnings. She concomitantly assesses the state of readiness of the student in terms of prior learnings and behaviors which seem relevant to the learning task at hand. She then devises an instructional strategy which takes both curricular and student facts into account. We are talking here about the old-fashioned process of diagnostically-based instruction.

It seems that we could dramatically effect the educational progress of all students if a large investment were made along these lines. The idea though simple to state, would be extremely laborious to execute. What would be needed first would be detailed analyses of tasks or objectives expressed in behavioral terms. We know of two groups who have attempted such work to date. Gagné (1966) describes a number of such analyses of cumulative learning in mathematics. For example, he attempts to analyze the task of learning to "add integers" into a hierarchical sequence of learnings which begins with the least complex learnings (associations) and proceeds in hierarchical fashion to the learning of simple and complex rules and principles. The task analysis which begins as a logical one can then be verified in part in the actual performance of students. He has found that learning to add integers does in fact follow the hierarchical sequence he proposed; that is, students who learn higher level tasks have achieved the lower levels. Children who have not mastered the lower level tasks in the hierarchy do not learn the higher level tasks.

This type of task analysis provides sequencing for the instructional program and diagnostic power. Such analyses since they are made in behavioral terms could be readily translated into quick testing procedures to assess a student's readiness for learning a given task. Such testing would immediately orient the teacher to that part of the instructional sequence to begin with a student.

Another example of this type of work is provided by Smilansky (1964). Their interest was in the development of a kindergarten curriculum which would provide disadvantaged Israeli children with the necessary skills and behaviors to enter the first-grade curriculum. The approach they used was to begin with first-hand observations of successful first-grade children in classrooms. They analyzed the behaviors required of the students in these classrooms, compiling a long list. They then constructed assessment techniques which would give evidence about these behaviors in five-year-old children. Simultaneously, they started to develop curricular approaches which would develop these behaviors in children who had not achieved them. The final success of their intervention program will be judged in terms of the achievement of these objectives in disadvantaged children.

Both the Gagné and Smilansky approach result in very detailed statements of behavioral requirements for a learning task. They do not specify how the teacher would proceed in the instructional program but they do pinpoint where to begin. In addition, the effort invested in the logical analysis of the task requirements, or the actual observation of children achieving tasks, is highly suggestive of instructional strategies.

A heavy investment in such analyses of curriculum, and the development of diagnostic techniques which are curriculum specific could make high-value information readily available to the teacher.

The task analysis approaches we have described should serve as first steps in an iterative matching strategy. One begins with a set of behavioral characteristics which fit a learning task. Students are assessed to see which behaviors and prerequisite skills they display. Then an instructional procedure is adapted for the student. The process is iterative as we can anticipate continuous refinements of both the assessments of students and the instructional procedures in the context of a given task. In addition, the process should be a continuous one, applying to each new task as it is reached.

The matching of instructional procedures to student characteristics could take at least two forms. One would be essentially remedial. That is, an instructional method would be settled on in advance that would be considered suitable for all students. Therefore only one set of prerequisite skills would have to be achieved by all students. After assessment of students, the teacher's first job would be to bring all students to this one configuration of necessary minimal skills before proceeding with the pre-selected regimen. Although this remedial strategy would clearly improve much current practice as there often is only one instructional method sanctioned by a school system, it is not the most desirable approach.

The second approach would make use of multiple instructional methods. Certain initial patterns of skills and learnings would be associated with certain instructional procedures. Optimal matching of students to curricular approaches could then be executed on the basis of initial assessments. Such matching would be far more diagnostic and precise than the usual sorts of tracking which goes on in the schools. School tracking, at least in the early years, is usually based entirely on level of student ability. Under such a procedure student characteristics are not meaningfully articulated with curricular contents or requirements. The real power of the matching procedure we are suggesting would be in the extent to which alternative instructional strategies could be generated which were based on a complex analysis of student characteristics and curricular contents.

The research program we are suggesting would be a tedious one. First a large-scale investment in curricular analyses would be necessary. Once such analyses were completed, an enormous effort would have to be expended in the development of diagnostic methods which could be used effectively by teachers. Some of these methods might be widely useful whereas others might be very specific to a given school or classroom.

Let us take an example. A key area in the elementary school curriculum is beginning reading. At the present time there are a number of major approaches to the teaching of beginning reading. Considering the "pure" types for a moment we can list the phonics approach, the experience chart method, the look and say approach and the linguistics approach. In order for a child to begin any of these methods, certain common minimal skills are probably necessary, but in addition particular kinds of prerequisites are attached to each method. For all methods we could probably list: being able to follow simple directions, being able to attend to a lesson, certain minimal visual discrimination, minimal language comprehension, and a rudimentary understanding of what a symbol system is. Additional prerequisites may be attached to each method. For the phonics method, a certain level of sound discrimination may be required. For the look and say method, more in the way of short term memory for forms may be required. The experience chart method may require a certain willingness and ability to communicate an idea to an adult.

This analysis is hypothetical. Only observation and assessment would reveal the cutting points on various abilities and the patterns of prerequisite learnings which would be necessary for the beginning acts of learning to read. Such an analysis would take us systematically to a much sounder choice of methods for a given child. Since the analysis incorporates feedback, it would in all probability generate both new methods and combinations of the old.

Once this approach begins it would feed into a deeper understanding of the conditions of learning which are appropriate for children with various characteristics. It is to be hoped that it would lead to much more pointed learning experiments in which children could be selected on the basis of a wide variety of characteristics.

Extension of test construction from the point of view of the psychologist (such as in the Lesser work) should also contribute to this approach. Although it appears most efficient to start building diagnostic tools on the basis of curricular approaches, theories of intellect should also lead to profitable constructs. Once the matching procedure gets started, it has built-in corrective features. Analysis of curricular approaches leading to diagnostic tools will lead in turn to new insights into student performance and curriculum. The beginning point is not crucial as long as the process gets under way.

We have proposed a program of school-based research which we believe would enormously assist the work of teachers on a day to day basis. Most important it should have great value in creating more successful students because it recognizes the background they bring with them.

III. A Specific Case of Research: Development of Mental Abilities of Children from Different Social-Class and Ethnic Groups.

We have presented to this point a general review of research on learning patterns in the disadvantaged and directions for new research suggested by this review. We turn now to a specific case of research on learning patterns in the disadvantaged, some future research suggested by this specific study, and, to some implications of the study for educational policy.

A. The Original Study:

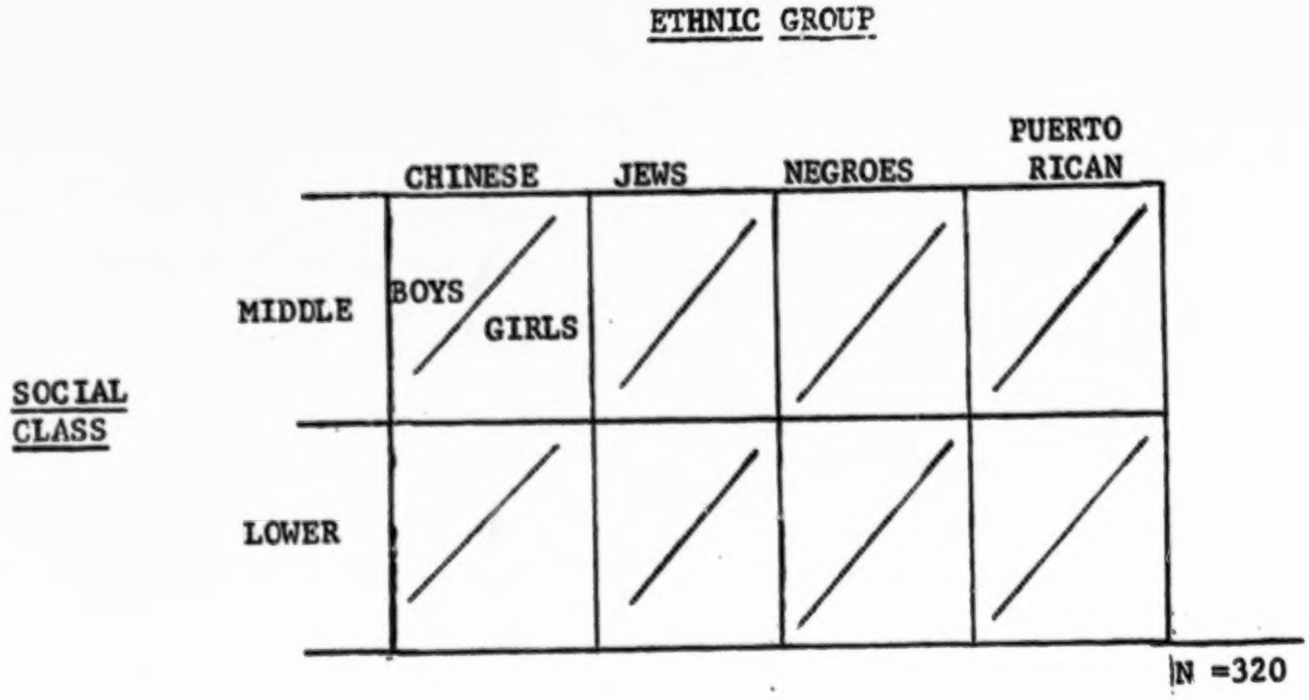
1. Aims:

Our goal is to examine the patterns among various mental abilities in six- and seven-year old children from different social-class and ethnic backgrounds. We accepted the definition of intelligence which postulates diverse mental abilities and proposes that intelligent behavior can be manifested in a wide variety of forms, with each individual displaying certain areas of intellectual strength and other forms of intellectual weakness. This definition of intelligence provided a basic premise for this study: that social-class and ethnic influences differ not only in degree but in kind, with the consequence that different kinds of intellectual skills are fostered or hindered in different environments.

2. Design:

Hypotheses were tested regarding the effects of social-class and ethnic-group affiliation (and their interactions) upon both the level of each mental ability considered singly and the pattern among mental abilities considered in combination. Four mental abilities (Verbal ability, Reasoning, Number facility, and Space Conceptualization) were studied in first-grade children from four ethnic groups (Chinese, Jewish, Negro, and Puerto Rican). Each ethnic group was divided into two social-class components (middle and lower), each in turn being divided into equal numbers of boys and girls.

Thus, a 4 x 2 x 2 analysis-of-covariance design included a total of 16 subgroups, each composed of 20 children. A total sample of 320 first-grade children was drawn from 45 different elementary schools in New York City and its environs. Three test influences were controlled statistically: effort, responsiveness to the tester, and age of the subject.


ETHNIC GROUP
CHINESE
JEWS
NEGROES
PUERTO RICAN
SOCIAL CLASS
MIDDLE
LOWER
BOYS
GIRLS
N =320

3. Procedural Issues:

In this brief report, it is impossible to describe all the details of the procedures employed. However, since research on the intellectual performance of "disadvantaged" children does impose some unique demands upon the investigator, at least the following procedural issues should be mentioned here.

a. Gaining access to the schools:

Perhaps the most formidable problem was that of gaining the cooperation of school boards and school authorities for research on such a supposedly controversial issue. An honest approach by the researcher to the school authorities must contain the words "ethnic," "Negro," "Jewish," and "lower-class," and yet is is precisely these loaded words which arouse immediate anxiety and resistance in those who are authorized to permit or reject research in the schools. We believed that our objective of supplying information and understanding about the intellectual strengths and weaknesses of the children being taught in school would be a strong inducement to participation. Not so. Only enormous persistence and lengthy negotiation -- during which the researcher must agree to a succession of incapicitating constraints permits such research at all.

Surely there are serious problems of ethics in educational research. Researchers should be (and most often are) as scrupulous as school authorities in maintaining the conditions of consent and confidentiality which protect subjects from unwarranted intrusions of privacy. But the legitimate ethical issues of privacy and free inquiry are not those that block access to the schools -- the fear of controversy over racial issues seems to immobilize school authorities.

Beyond our own experiences in gaining access to the schools, numerous examples exist of how research on the disadvantaged is prevented or distorted by the decisions of school authorities. For example, in Coleman's (1966) study of Equality of Educational Opportunity, requested by the President and Congress of the United States, thirteen major cities refused to participate, often because comparisons among racial groups were being made (although reasons for refusal were rarely stated).

Later in this paper, we shall discuss several new directions for future research comparing "disadvantaged" and "non-disadvantaged" children. These suggestions will remain the mental exercises of the academics unless some reasonable policies can be developed by researchers and school authorities to provide honest access to the school children, their parents, and their teachers.

b. Locating social-class and ethnic-group samples:

An associated problem was to achieve an unambiguous definition and assessment of social-class and ethnic-group placement. Both variables are clearly multidimensional in character, and to define and measure the necessary components of each is a formidable task. Since members of each ethnic group were to be located in both lower- and middle-class categories, additional problems arose in attempting to maintain an equal degree of separation between the two social-class categories for each ethnic group.

Obtaining the data necessary to identify the social-class and ethnic-group placement of each child presented many practical problems. There were strong legal restrictions in New York State upon collecting the data necessary for social-class and ethnic identification -- and these restrictions are perhaps quite justified -- but since we were not allowed to ask parents or school authorities directly about education, or religion, or even occupation, we were forced to use information gathered indirectly through twenty-three different community agencies and four sources of Census and housing statistics. Among sources such as the New York City Regional Planning Association, the Commonwealth of Puerto Rico, the China Institute in America, the Demographic Study Committee of the Federation of Jewish Philanthropies, and the New York Daily News Advertising Department, our best single source of information was one of the largest advertising agencies in New York City, which has within its "Component Advertising Division" (which develops special marketing appeals for different ethnic groups) enormous deposits of information on the locations of the many cultural groups in New York City. There was little willingness, of course, to allow us to use these data, but after endless sitting-in and sheer pestering we were given access to this information. We could not possibly have completed this study without it.

c. Developing "culture-fair" test materials:

Perhaps the major technical problem was to insure the fact that observed differences among social-class and ethnic groups reside in the children and not in the test materials themselves (or in the definitions upon which the tests are based). To accomplish this, tests were constructed which presuppose only experiences that are common and familiar within all of the different social-class and ethnic groups in an urban area. We had no intention to "free" the test materials from cultural influence, but, rather the tests utilize elements which appear commonly in all cultural groups in New York City. If, for example, other Picture Vocabulary tests use pictures of xylophones or giraffes (which a middle-class child is more likely than a lower-class child to encounter in a picture book or in a zoo), we used pictures of buses, fire hydrants, lamp posts, garbage trucks, and police cars -- objects to which all urban children are exposed.

d. Controlling "examiner bias:"

Each child was tested by an examiner who shared the child's ethnic identity in order to maintain chances of establishing good rapport and to permit test administration in the child's primary language, or in English, or, more often, in the most effective combination of languages for the particular child. Thus, we had a Negro examiner, a Spanish-speaking Puerto Rican tester, a Yiddish-speaking Jewish tester, and three Chinese-speaking Chinese testers to accomodate the eight different Chinese dialects encountered among our Chinese children. Each tester had been trained beyond the Master's Degree level and each had extensive experience administering psychological tests, but the tendency of the testers to empathize with the children from their own cultural groups demanded careful control of the testing procedures to insure uniform test administration. This was accomplished by the use of extensive video-tape training experiences in which each examiner observed other testers and himself administer the test materials. The capability of video-tape to allow self-viewing and the repeated review of test sessions permitted the establishment of uniform test procedures.

4. Some Findings:

Hypotheses were tested regarding the influence of social class and ethnicity (and their interactions) upon the levels of the four mental-ability scores and upon the patterns among them. The results are summarized as follows:

Table 1

Summary of Results

	Effect upon Mental Abilities	
Source of Influence	Level	Pattern
Ethnicity	Highly Significant	Highly Significant
Social Class	Highly Significant	Nonsignificant
Social Class X Ethnicity	Significant	Nonsignificant

a. Distinctive ethnic-group differences:

Ethnic groups are markedly different both in the absolute level of each mental ability and in the pattern among these abilities. For example, with regard to the effects of ethnicity upon the level of each ability, Figure 1 shows that

a. on Verbal ability, Jewish children ranked first (being significantly better than all other ethnic groups), Negroes second and Chinese third (both being significantly better than Puerto Ricans), and Puerto Ricans fourth.

b. on Space Conceptualization, Chinese ranked first (being significantly better than Puerto Ricans and Negroes), Jews second, Puerto Ricans third, and Negroes fourth.

But the most striking results of this study concern the effects of ethnicity upon the patterns among the mental abilities. Figure 1 (and the associated analyses-of-variance for group patterns) shows that these patterns are different for each ethnic group. More important is the finding depicted in Figures 2-5. Ethnicity does affect the pattern of mental abilities and, once the pattern specific to the ethnic group emerges, social-class variations within the ethnic group do not alter this basic organization. For example, Figure 2 shows the mental-ability pattern peculiar to the Chinese children -- with the pattern displayed by the middle-class Chinese children duplicated at a lower level of performance by the lower-class Chinese children. Figure 3 shows the mental-ability pattern specific to the Jewish children -- with the pattern displayed by the middle-class Jewish children duplicated at a lower level of performance by the lower-class Jewish children. Parallel statements can be made for each ethnic group.

The failure of social-class conditions to transcend patterns of mental ability associated with ethnic influences was unexpected. Social-class influences have been described as superceding ethnic-group effects for such diverse phenomena as child-rearing practices, educational and occupational aspirations, achievement motivation, and anomia. The greater salience of social class over ethnic membership is reversed in the present findings on patterns of mental ability. Ethnicity has the primary effect upon the organization of mental abilities, and the organization is not modified further by social-class influences.

Many other findings are described in our full report of this original study (Lesser, Fifer, and Clark, 1965). Only a few additional findings will be mentioned here, either because they were prominent in our recent replication study or in our plans for future research.

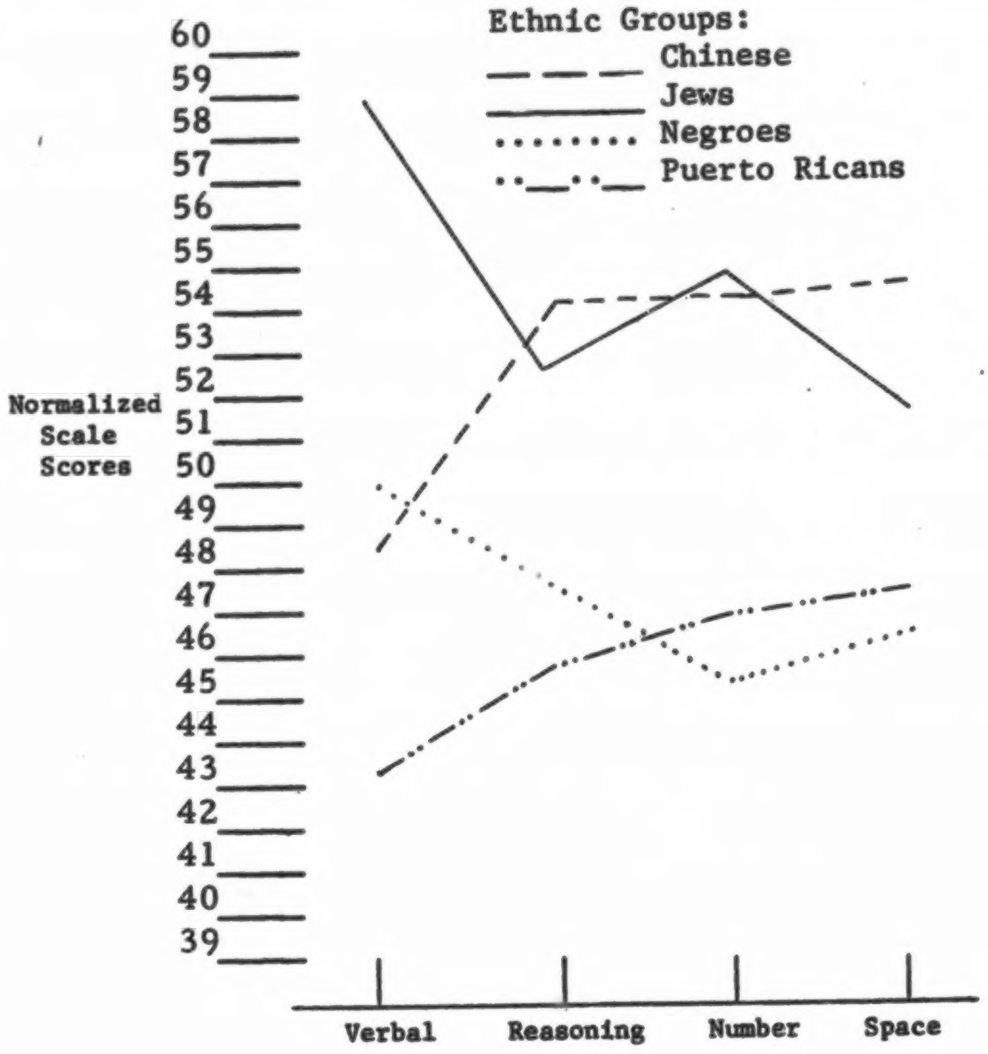


Figure 1.--Pattern of normalized mental-ability scores for each ethnic group.

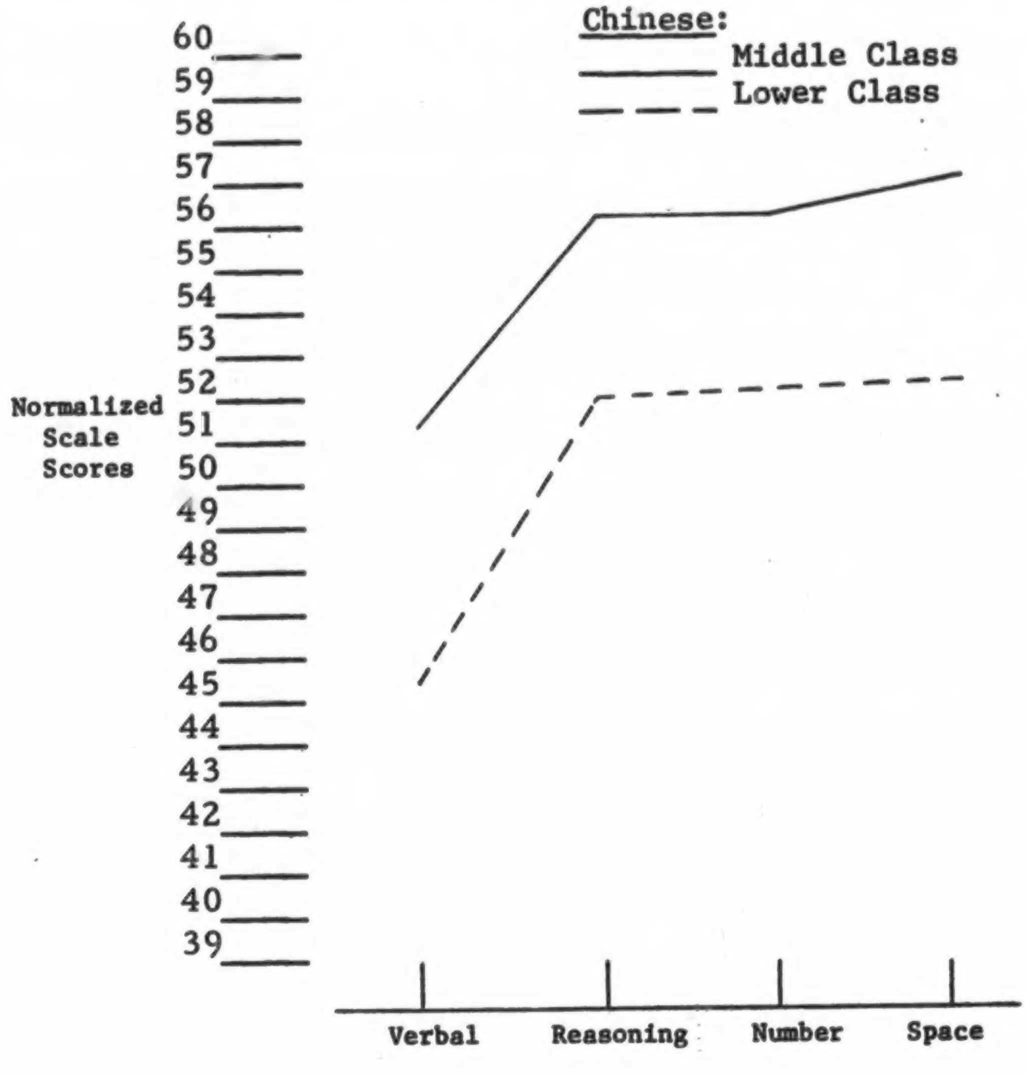


Figure 2.--Patterns of normalized mental-ability scores for middle- and lower-class Chinese children.

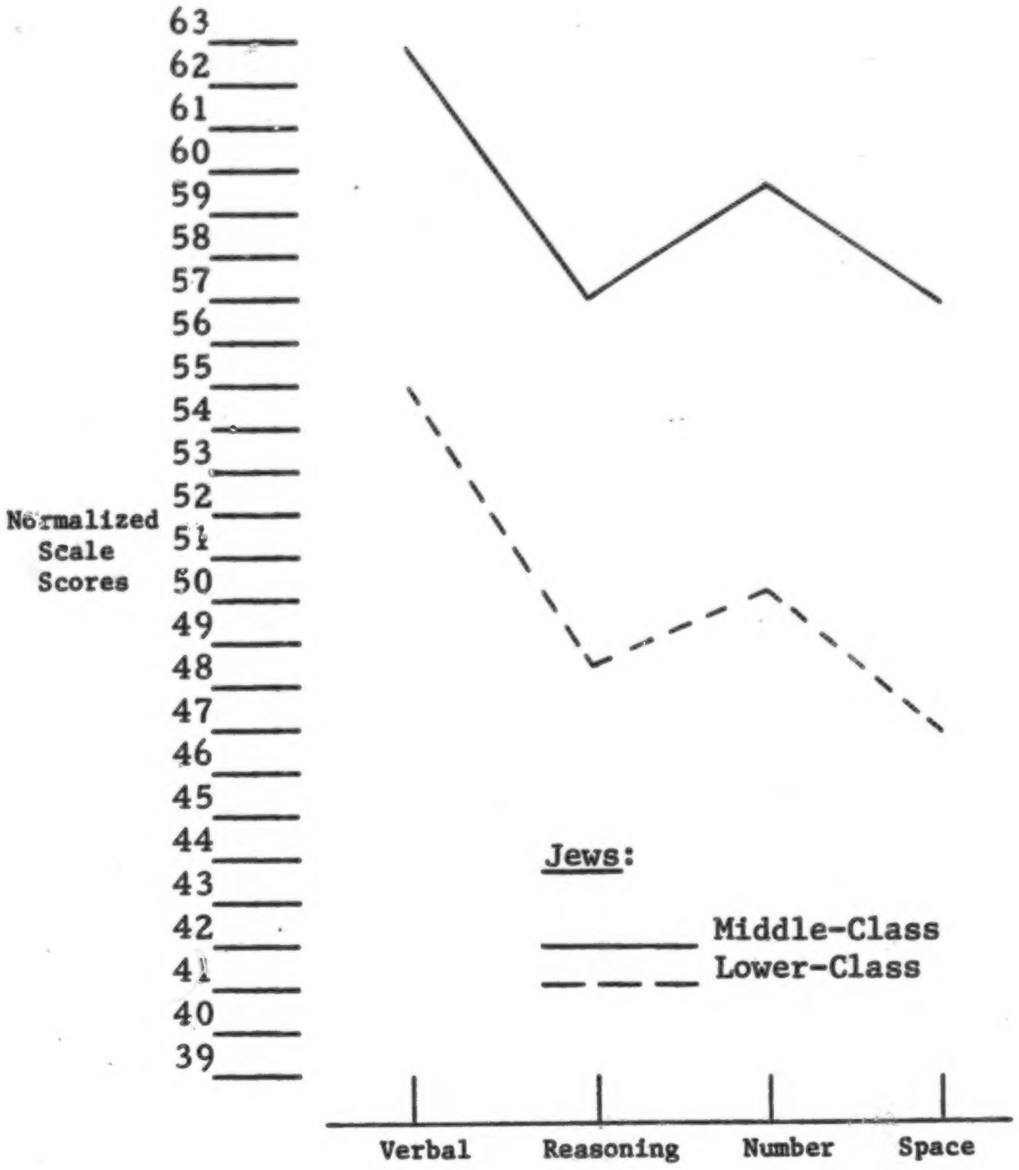


Figure 3.--Patterns of normalized mental-ability scores for middle- and lower-class Jewish children.

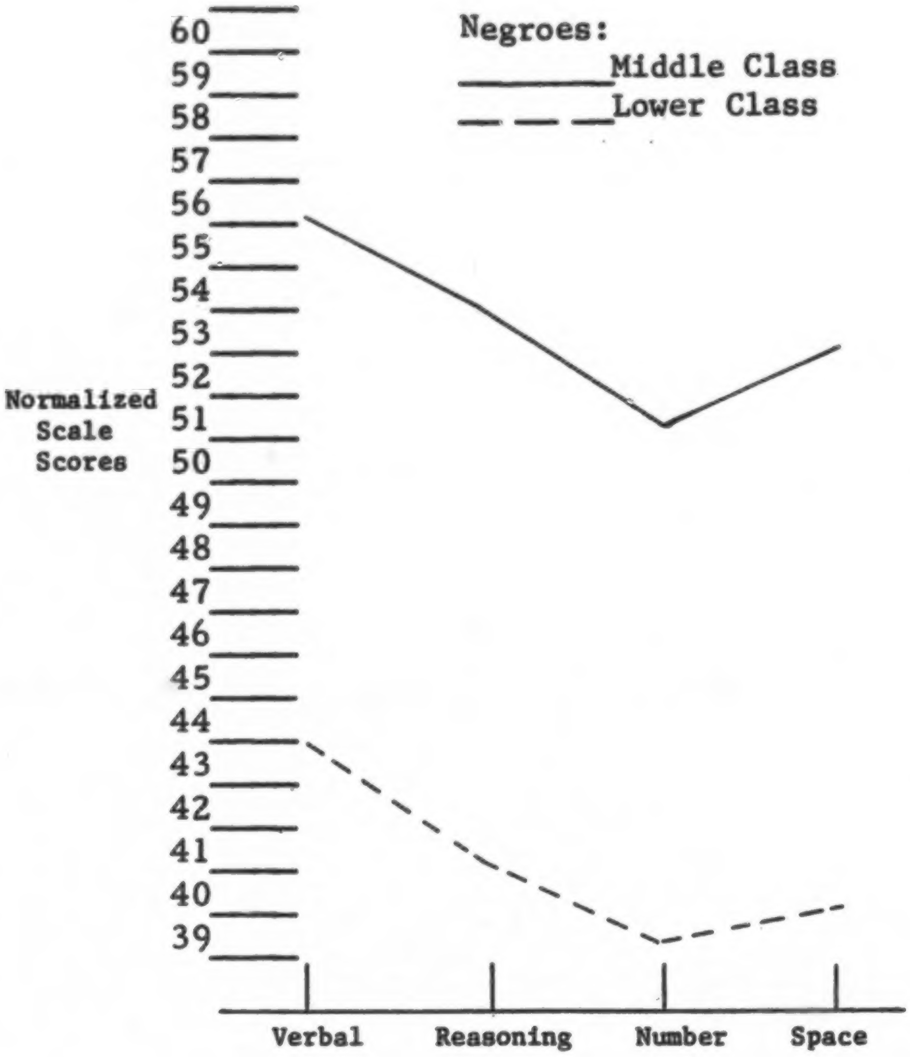


Figure 4.--Patterns of normalized mental-ability scores for middle- and lower-class Negro children.

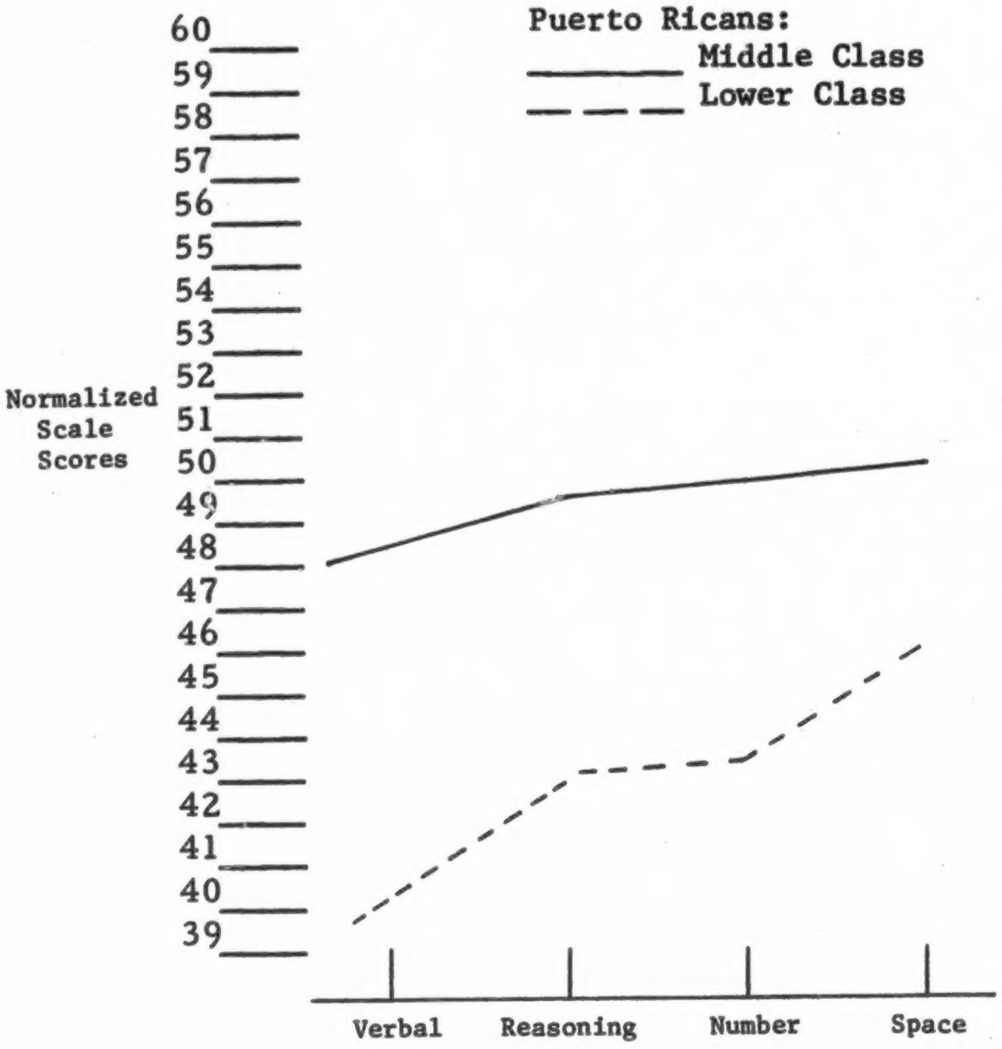


Figure 5.--Patterns of normalized mental-ability scores for middle- and lower-class Puerto Rican children.

b. Interactions between social-class ethnicity:

Table 1, summarizing our earlier findings, indicates significant interactions between social class and ethnicity on the level of each mental ability. Table 2 shows the mean level of each mental ability for Chinese and Negro children from each social-class group; the same interaction effects appear when Jewish and Puerto Rican children are included, but the present table has been reduced to the Chinese and Negro children to simplify the present discussion. Two effects combine to produce the interaction effect between social class and ethnicity:

a. On each mental-ability scale, social-class position produces more of a difference in the mental abilities of the Negro children than for the other groups. That is, the middle-class Negro children are more different in level of mental abilities from the lower-class Negroes than, for example, the middle-class Chinese are from the lower-class Chinese.

b. On each mental-ability scale, the scores of the middle-class children from the various ethnic groups resemble each other to a greater extent than do the scores of the lower-class children from the various ethnic groups. That is, the middle-class Chinese, Jewish, Negro, and Puerto Rican children are more alike in their mental ability scores than are the lower-class Chinese, Jewish, Negro, and Puerto Rican children.

2

TABLE 2

MEAN MENTAL-ABILITY SCORES FOR CHINESE AND NEGRO CHILDREN FOR EACH SOCIAL-CLASS GROUP

Verbal

	Chinese	Negro	
Middle	76.8	85.7	81.3
Lower	65.3	62.9	64.1
	71.1	74.3	72.7

Class and ethnicity, $F=7.69$ $p < .01$

Reasoning

	Chinese	Negro	
Middle	27.7	26.0	26.9
Lower	24.2	14.8	19.5
	25.9	20.4	23.2

Class and ethnicity, $F=11.32$, $p < .01$

Number

	Chinese	Negro	
Middle	30.0	24.7	27.4
Lower	26.2	12.1	19.2
	28.1	18.4	23.3

Class and ethnicity, $F=8.91$, $p < .01$

Space

	Chinese	Negro	
Middle	44.9	41.8	43.4
Lower	40.4	27.1	33.8
	42.7	34.4	38.6

Class and ethnicity, $F=10.83$, $p < .01$

Some earlier research (see Anastasi, 1958, Chapter 15) suggested that social-class influences upon intelligence are greater in white than in Negro groups. No distinct contrast with white children was available in our study, but the evidence indicates that social-class influences upon the mental abilities of Negro children are very great compared with the other ethnic groups represented. One explanation for the apparent contrast between the earlier and present findings is that the earlier research, perhaps, did not include middle- and lower-class Negro groups that were distinctively different. In any event, our findings show that the influence of social-class on the level of abilities is more powerful for the Negro group than for the other ethnic groups.

c. Group data vs. individual data:

The data analyses described to this point refer to differences in the performance of groups and not to the performance of individuals. These analyses do not indicate how an individual will perform, but they suggest how he is likely to perform, if he belongs to one of these eight groups. One technique we have used to proceed from group analyses to identifying particular patterns for individuals is called a "classification analysis" (see Table 3). This analysis allows the researcher to compare the pattern of mental-ability scores for each individual subject with the pattern profiles of his group and other groups. It yields data on the degree to which a subject's profile resembles the profile of his or the other groups (Tatsuoka, 1957). If mental-ability scores were not associated significantly with social-class and ethnicity, and hence a chance frequency of correct placement of individuals occurred, random cell assignment in

Table 3 would be approximately 5 cases per cell. Thus, if the 40 middle-class Chinese children showed no distinctive pattern of their own, they would be expected to be distributed equally among all eight group patterns. The deviation of the actual frequencies in the underlined diagonal cells from the chance frequency of five indicates the degree of correct classification beyond chance obtained through knowledge of the individual's mental-ability scores. Thus, 32 middle-class Jewish children and 28 lower-class Negro children fit their group patterns. In contrast, only three middle-class Puerto Rican children (two less than chance) were classified correctly. It is clear that the middle-class Puerto Rican children were the most heterogeneous of the eight groups. Overall, the number of cases classified correctly through knowledge of the mental-ability pattern surpassed chance classification at a probability value associated with thirty-six zeroes, i.e. the "p" value for correct classifications was less than one in ten to the thirty-fifth exponent. At this point the computer stops processing zeroes. In short, knowledge of the child's pattern of mental abilities allows the correct identification of his social-class and ethnic-group membership to a degree far exceeding chance expectations.

We note this analysis for two reasons. Methodologically, it provides a useful device for moving from group data to the analysis of the individual case. Substantively, it has allowed us to identify the children who fit closely the profile of their group and those who are exceptions in their group but resemble the profile of some other group. This capability allows us to pinpoint cases in exploring questions about the origins of patterns of mental ability and about the fitting of school practices to these patterns.

TABLE 3

Classification Analysis

Group N = 40, each Group	Group Patterns M Ch	L Ch	M J	L J	M N	L N	M PR	L PR
Middle Chinese	13*	10	6	1	5	1	2	2
Lower Chinese	6	14	2	4	3	1	1	9
Middle Jewish	4	0	32	4	0	0	0	0
Lower Jewish	0	1	9	18	7	4	0	1
Middle Negro	5	1	11	10	11	0	0	2
Lower Negro	1	3	0	3	0	28	0	5
Middle Puerto Rican	6	6	3	6	4	0	3	12
Lower Puerto Rican	0	7	1	1	0	8	3	20

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*Figures to be read across as follows: The scores of 13 middle-class Chinese subjects fit the middle-class Chinese pattern and level on the four mental ability scales; 10 middle-class Chinese look more like lower-class Chinese; 6 look more like middle-class Jews, 1 more like a lower-class Jew, etc.

5. Some Conclusions:

The study demonstrated that several mental abilities are organized in ways that are determined culturally. Referring to social-class and ethnic groups, Anastasi (1958) proposed that "groups differ in their relative standing on different functions. Each ... fosters the development of a different pattern of abilities." Our data lend selective support to this position. Both social-class and ethnic groups do "differ in their relative standing on different functions," i.e., both social class and ethnicity affect the level of intellectual performance. However, only ethnicity "fosters the development of a different pattern of abilities," while social-class differences within the ethnic groups do not modify these basic patterns associated with ethnicity.

To look ahead to our discussion of defining and delimiting the term "disadvantaged:" if in our study we define the "disadvantaged" as belonging to a particular ethnic group, this has one set of consequences for the development of intellectual skills -- ethnic groups differ in both level and pattern of mental abilities. If we define the term using the social-class criteria of occupation, education, and neighborhood, the consequences are quite different -- social class affects level of ability, with middle class being uniformly superior, but does not alter the basic patterns of mental ability associated with ethnicity. Still other definitions -- for example, unavailability of English language models, the presence of a threatening and chaotic environment, matriarchal family structure, high family mobility, parental absence or apathy, poor nutrition -- probably generate still other consequences, although we really know very little empirically about these relationships.

B. A Replication Study[1]:

Since our early results were both surprising and striking in magnitude, our next step was to conduct a replication and extension with first-graders in Boston. The replication was conducted with middle-class and lower-class Chinese and Negro children (the samples of Jewish and Puerto Rican children who fit our social-class criteria were not available); the extension included another ethnic group -- children from middle- and lower-class Irish-Catholic families.

Once again, the results were both striking and surprising. The replication data on Chinese and Negro children in Boston duplicated almost exactly our earlier data on similar samples in New York City. The striking, almost identical test performances in the original and replication study is shown in Figures 6-10. The raw mean scores of the Chinese children in Boston and in New York were different by an average of one-third of one standard deviation (Figure 6), and the Negro children in Boston and in New York were one-fifth of one standard deviation different from each other (Figure 7). Only one mean difference (numerical scores of Boston and New York Chinese) slightly exceeded one-half of one standard deviation.

The resemblance of the original and replication samples in patterns of mental ability is shown in Figure 8 (which contrasts the ethnic groups in the two cities with middle- and lower-class samples combined), Figure 9 (which displays the Chinese patterns in Boston and New York for each social-class group), and Figure 10 (which displays the Negro patterns in Boston and New York for each social-class group). With very

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[1] This replication study was conducted under the direction of Dr. Jane Fort, Laboratory of Human Development, Harvard University.

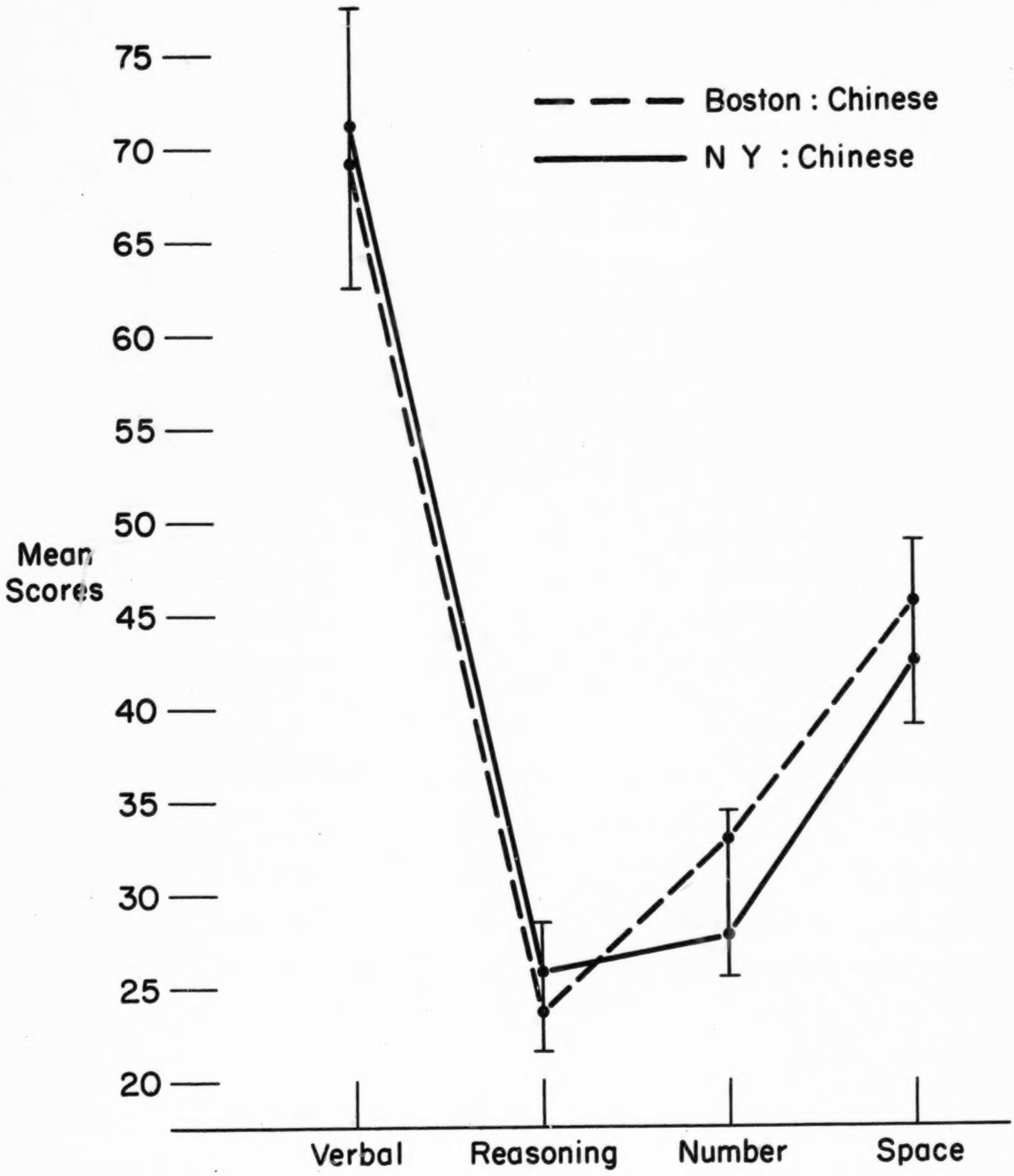

Figure 6. - Mean mental ability scores for Chinese children in Boston (N=20) and New York (N=80).

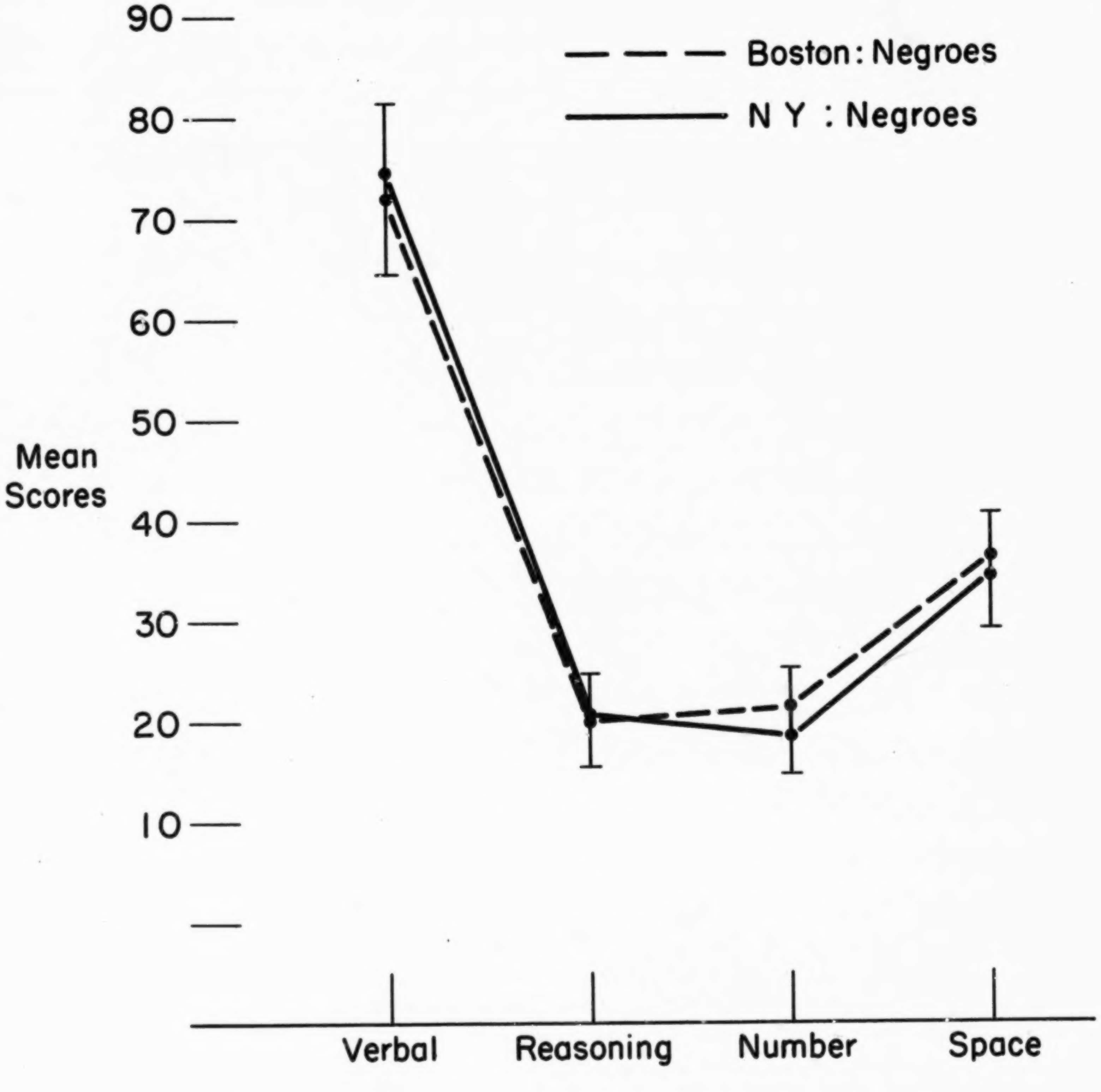

Figure 7. — Mean mental ability scores for Negro children in Boston (N=20) and New York (N=80).

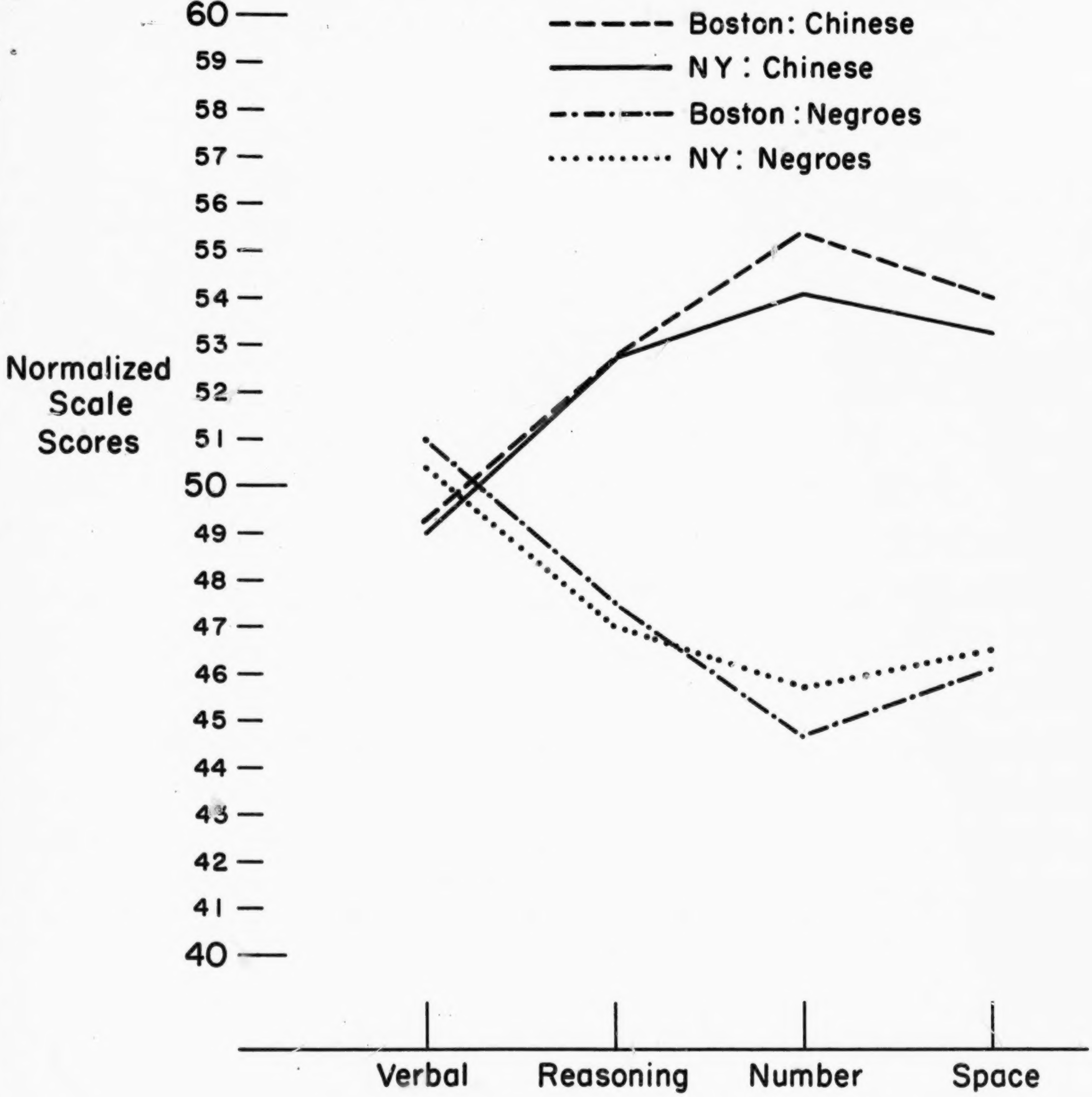

Figure 8.— Patterns of mental ability for Chinese and Negro children: NY vs. Boston.

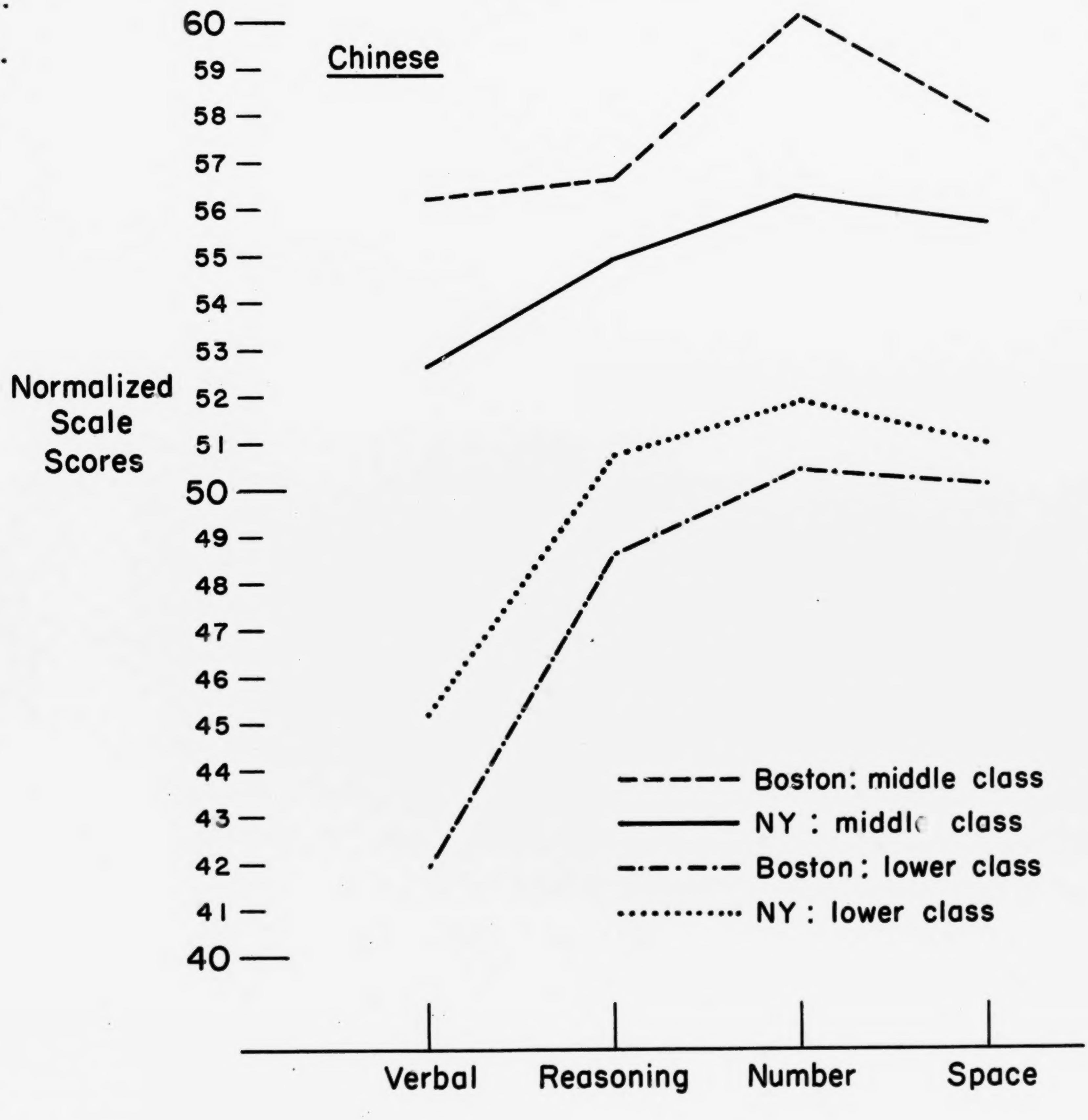

Figure 9. – Patterns of mental ability for Chinese children; middle-and lower-class, NY vs. Boston.

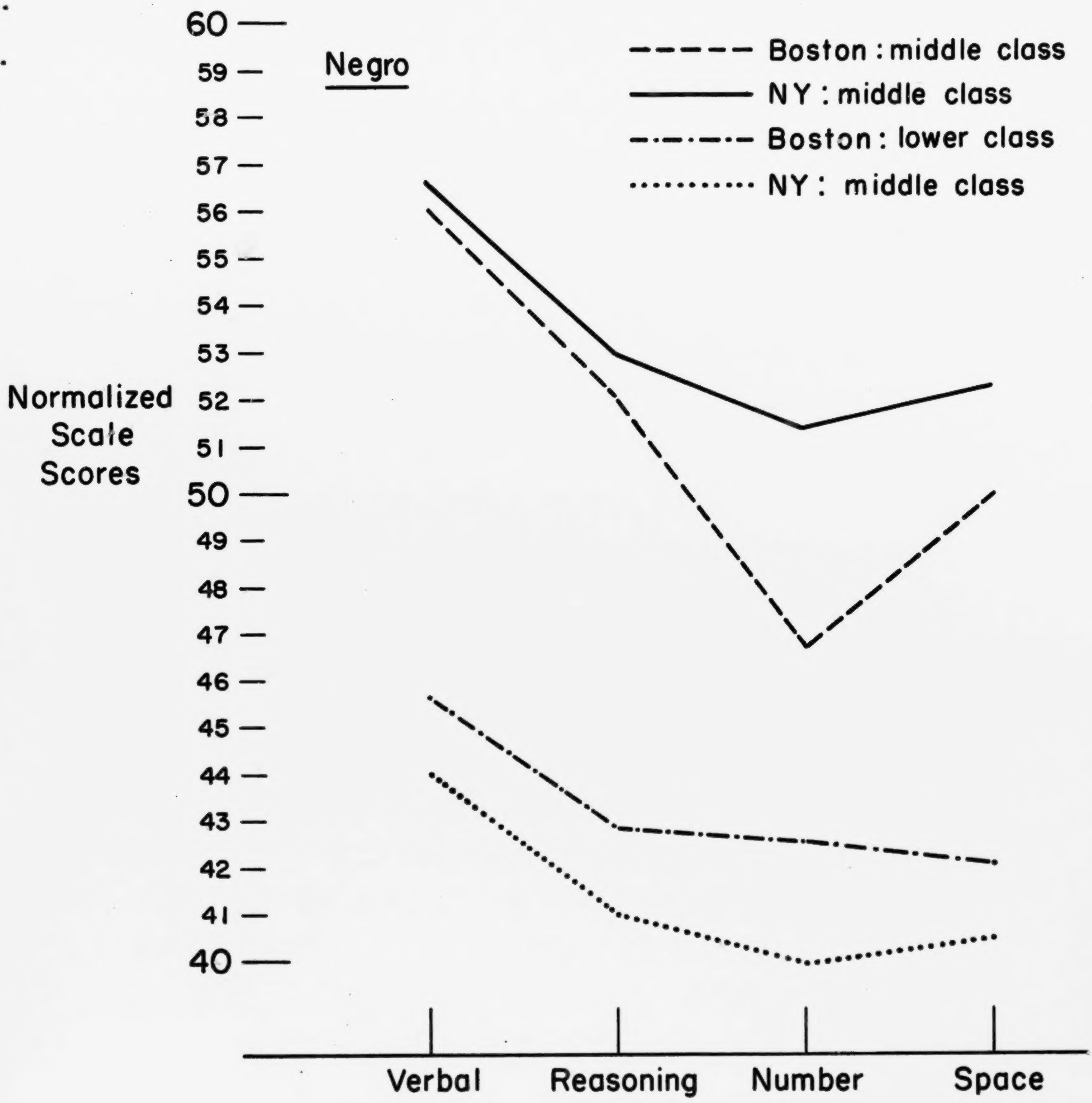

Figure 10.- Patterns of mental ability for Negro children; middle-and lower-class, NY vs. Boston.

few exceptions (number skills, especially multiplication and division, of the middle-class Chinese in Boston are slightly superior to the middle-class Chinese in New York), both the levels and patterns of mental ability in the Boston data almost duplicate the New York City data for Chinese and Negro children.

This replication study also included an ethnic group not previously studied in New York City: middle- and lower-class Irish-Catholic children. These first-grade Irish-Catholic children, however, in contrast to all the other ethnic groups tested, displayed neither a distinctive ethnic-group pattern or the similarity of patterns for middle- and lower-class segments of the Irish-Catholic sample. Although we have no definitive explanation of this finding as yet, the absence of a distinctive ethnic-group pattern seems related to our failure to locate homogeneous concentrations of middle- and lower-class Irish-Catholic families in Boston. The Irish-Catholic families are less confined to limited geographic areas than the other ethnic groups and are more diffused throughout the city. We could not locate either middle- or lower-class Irish-Catholic families who fit clearly the occupational, educational, and neighborhood criteria for social-class placement. In short, there are at least two plausible explanations for the failure to replicate our results on other ethnic groups with the Irish-Catholic children: poor sampling of middle-class and lower-class Irish-Catholic families (due to their unexpected unavailability in Boston) or a real difference between Irish-Catholic children and those from other ethnic groups. We are pursuing this issue.

In the report of our original study, we noted an interaction effect between social class and ethnicity in which the social-class difference produces more of a difference in the mental abilities of the Negro children than for the other ethnic groups. In the replication study, this finding reappeared: the middle-class Negro children are more different in level of mental abilities from the lower-class Negro children than the middle-class Chinese or Irish-Catholic children are from lower-class Chinese or Irish-Catholic children. It was also true in the replication, as in the original data, that the scores of the middle-class children from the various ethnic groups resembled each other more than the scores of the lower-class children from these ethnic groups. That is, the Chinese, Irish-Catholic, and Negro children are more alike in their mental ability score (with the one exception of the middle-class Chinese in numerical ability) than are the lower-class Chinese, Irish-Catholic, and Negro children.

One further specific analysis should be noted before proceeding to a discussion of future research and the implications for educational policy. Now that five ethnic groups have been tested, we assessed their relative contribution to the distinctiveness of ethnic-group patterning. The percentage of total ethnicity variance contributed by each ethnic group was as follows:

Table 4

Percentage of Variance Contributed by Each Ethnic Group to the Groups x Tests Interaction Term

Ethnic Group	% of Variance
Chinese	39
Irish-Catholic	1
Jewish	38
Negro	13
Puerto Rican	9

While the groups differ markedly in their relative contributions to the distinctiveness of ethnic-group patterns, all (except for the Irish-Catholic) contribute to a statistically significant degree.

The results of several recent studies are compatible with these findings. For example, Coleman's (1966) study of Equality of Educational Opportunity included first-grade (as well as third, sixth, ninth, and twelfth grade) children from Oriental American, Negro, Puerto Rican, Mexican American, Indian American, and white groups. This study does not include all our mental-ability variables nor does it provide a good assessment of social-class for the younger children, but Coleman's data for Chinese, Negro, and Puerto Rican children on Verbal and Reasoning tests show patterns very similar to ours.

We do have some confidence, then, in our earlier findings on the effects of social-class and ethnic-group influence on the development of patterns of mental abilities in young children: at least several mental abilities are organized in ways that are determined culturally, social class producing differences in the level of mental abilities (the middle class being higher) and ethnic groups producing differences in both level and pattern of mental abilities.

C. Future Research:

To pursue the educational relevance of these findings, we are now studying the following questions:

1. What actual school behaviors are predicted by the patterns of mental ability?

2. Are the differential patterns related to ethnic-group differences stable over time or do intervening experiences modify them?
3. What are the specific origins or antecedents of differential patterns of mental ability?
4. How can our knowledge about patterns of mental ability be fitted to the content and timing of instruction?

1. Mental-Ability Patterns as Predictors of School Achievement:

Mrs. Stodolsky has stressed the importance of examining a variety of criteria related to school achievement in research on the "disadvantaged." We are assessing the predictive value of our mental-ability data for forecasting various patterns of school achievement, asking these questions: is there an optimal pattern of mental abilities that results in superior school performance or are different optimal patterns associated with superior school performance in different subject-matter areas? If optimal patterns are identified, can the child's abilities be reinforced differentially so that these optimal patterns are produced or should the educational program adjust itself to the relative strengths and weaknesses of the child?

Convincing laboratory demonstrations (e.g., Duncanson, 1966) exist of the interrelations between measures of abilities and performance on several learning tasks. Using our mental-ability measures as predictors, we are attempting to extend these analyses to classroom learning performance.

In the research effort on matching instructional strategies and patterns of abilities, which we shall describe in a moment, we go more deeply into the relationship between types of intelligence and school performance. The achievement test measures used in our predictive validity study are static criteria of school performance; what really interests us is the predictive value of the mental-ability measures in forecasting learning in response to variations in instructional strategies. However, the relationships between mental-ability patterns and achievement test measures do provide some assessment of the predictive validity of the mental-ability patterns.

2. Stability over Time of Mental-Ability Patterns:

Will the major finding of this study, that differential patterns of ability are related to ethnic-group differences, remain stable across age groups? That is, does ethnic-group membership continue to determine the pattern of abilities for children with increasing maturity? Do the relative strengths and weaknesses of the subjects represent different rates of learning that eventually level off to a more or less common mean for all groups, or do they indeed represent stable cognitive organizations? What is the role of school experience in modifying distinctive ethnic-group patterns? That is, do the different patterns of mental ability persist in spite of the possible homogenizing effects of schooling through the heavy emphasis on verbal forms of instruction and the de-emphasis on the use of other intellectual skills?

To answer these questions, we have recently completed the construction of an upward extension of the tests of mental ability, providing appropriate measuring instruments for fifth- through eighth-grade children. Since our original New York City sample will be entering sixth-grade and we have located about 85% of them, we will attempt to assess the size and magnitude of changes in mental-ability patterns over a five-year period.

There are few empirical precedents here. Studies of the differentiation of mental ability have not traced the course of social-class and ethnic influences through the use of samples followed longitudinally. Evidence on ethnic-group variations on samples of older subjects is conflicting -- Stewart, Dole, and Harris (1967) do not find variations in the factorial structures of different ethnic groups, but Guthrie (1963) does. Cross-sectional findings (e.g., Meyers, Dingman, and Orpet, 1964) show stability in factorial structure across three age groups (2, 4, and 6-year-olds). But no direct evidence tells us whether there are ethnically-distinctive patterns of mental ability which persist, dissolve, or change with age.

3. Developmental Origins: Antecedents of Diverse Mental Abilities:

What early experiences produce the particular patterns of mental ability in different ethnic groups? Many different environmental influences may be operating: the reinforcements the parents offer for different types of intellectual performance, opportunities inside and outside the home for learning different skills, the value placed on different forms of intellectual performance, the parents' intellectual aspirations for the child, work habits developed in the home, and so forth. Some suggestions exist in the literature (e.g., Bing, 1963) that less direct child-rearing influences -- for example the fostering of dependence or independence or the presence of a tense parent-child relationship -- affect the development of mental abilities differentially.

We are now setting out to investigate the variations among ethnic groups in the history of differential experience in learning different mental skills. We assume that different emphases exist among ethnic groups in the specific intellectual functions that are stimulated and encouraged and these different emphases are reflected in their different organizations of mental abilities. This research demands a longitudinal analysis which begins very early in the child's life as well as naturalistic observation in and out of the home. Since the little empirical research on the history of differential mental abilities is essentially retrospective in design, extensive methodological development is demanded by this research.

4. School-Based Research: Matching Instructional Strategies to Patterns of Mental-Ability:

How can knowledge of a child's pattern of mental abilities be fitted to the content and timing of his instruction? How can instruction be adjusted to the particular strengths and weaknesses in the child's intelligence, or the child's intellectual abilities modified to meet the demands of instruction? In the context of individualizing instruction, we are attempting to fit instruction to particular forms of intelligence and vice versa. In the context of research design, we are searching for the interactions between instructional treatments and the abilities of the learner in order to determine how selected mental-ability variables are differentially related to learner performance under different treatments or conditions of instruction.

Answering these questions requires continuous, successive approximations to an analysis of the child's special combination of intellectual resources and the demands for intellectual resources placed upon him by the curriculum. We have begun two preliminary studies, one in the teaching of beginning reading, another in learning the concept of mathematical functions at the sixth-grade level. One approach we have used begins with an assessment of the child's particular pattern of mental ability and seeks to build an instructional strategy to capitalize on the child's intellectual strengths and minimize his weaknesses. For example, in teaching mathematical functions to children strong in Space Conceptualization but weak in Numerical facility, we use graphical presentation; in teaching the same concept to a child strong in Number facility but weak in Space Conceptualization, we rely on the manipulation of numbers in a tabular form. Using this approach, a correct matching of child and curriculum (e.g., a spatial child given a spatially-oriented curriculum) results in some learning for all children; however, there is wide variation in amounts of gain within the correctly-matched group. Incorrect matching (e.g., a numerical child given a spatially-oriented curriculum) results uniformly in insignificant gain. That is, at this point we seem to be able to create destructive mismatches more successfully than constructive matches. Practically, this is not much of a gain -- in our roles as teachers we have been creating mismatches for years. Conceptually, however, we are discovering the forms that the matching and mismatching of intelligence and curriculum can take. We consider this research a useful first approximation to the iterative process of matching curriculum and individual differences. We now have identified one set of necessary conditions for fitting instruction and individual differences: to learn a space-oriented curriculum, the child must possess (or be taught first) a specifiable minimum skill in space conceptualization. How far and how rapidly he progresses in responding further to the space-oriented curriculum is not explained by his initial status. It is therefore necessary to extend our assessment to other relevant attributes of the child and thereby extend the iterative process of matching curriculum and individual differences in intelligence.

Another approach to intelligence-curriculum matching starts with a task analysis of the intellectual demands imposed by a curriculum and proceeds to an analysis of the intellectual skills available to the child with the purpose of modifying or developing these skills to the requisite levels necessary to the task. Our only attack on this approach to date is some preliminary analysis of the modifiability of mental-ability variables. Some earlier work by Thelma Thurstone and more recent work at Educational Testing Service for first-graders in New York City and by Julian Stanley at Wisconsin hold promise that mental abilities can be modified to match the demands of the curriculum.

It is clear that knowledge of four mental abilities is insufficient to the task of matching individual differences in intelligence to the demands of complex curricula. It is also clear that we have few tools available for the adequate task analysis of different instructional strategies. Additional preliminary research is attempting to expand our conceptualization based on mental abilities by categorizing both the intellectual skills and the curriculum demands by means of three-dimensional models of intelligence, such as Guilford's (1959) scheme which includes not only mental operations (related to mental abilities) but contents and products as well, or Jensen's (1967) model which includes not only modality variables (related to mental abilities) but types of learning and procedures for presenting learning materials.

Thus, we are applying our analysis of patterns of mental ability to an issue which we believe has promise for classroom learning and teaching -- how to match instructional strategies and individual differences in intelligence to produce effective learning performance.

D. Implications for Educational Policy:

1. Coleman's Argument in "Equality of Educational Opportunity:" Equal Opportunity for Equal Development:

We mentioned earlier the recent study on Equality of Educational Opportunity directed by James S. Coleman (1966). The results and particularly the interpretation of this study provide a useful point of departure for analyzing the implications for educational policy of the data described here on ethnic-group and social-class differences in mental-ability patterns.

Coleman failed to find what he expected to find: direct evidence of unequal educational facilities in schools attended by children from different majority or minority groups. The study set out to document the fact that, for children of minority groups, school facilities are sharply unequal and this inequality is related to student achievement. The data did not support either conclusion. Instead, Coleman reports only small differences in school facilities, teacher experience and competence, and other direct indices of the quality of education, and -- anyway -- what differences did exist had little or no discernible relationship to the level of student achievement.

Starting with these facts, Coleman develops an argument which we shall contrast with the implications of the mental-ability study. Schools are still demonstrably unequal, he says, because Negro and white students do not display equal levels of educational achievement when they complete high school. _Ipso facto_, the schools are unequal, despite the absence of direct evidence of such inequality.

Coleman's argument starts with the premise that the proper function of the schools in a democracy is to produce equal achievement levels among different groups in our society. Arguing from this premise, the demonstrated fact that Negroes and whites are unequal in level of educational attainment testifies to the inequality of educational opportunities provided by the schools. That is, by definition, schools are designed to make groups equal. They do not do so. Therefore, schools are unequal in the educational opportunities they provide. Indeed, following this argument, the single decisive criterion for judging equal educational opportunity is that all groups be equal in school performance.

Coleman makes his position clear by saying that the role of the schools is to "...make achievement independent of background." This position is shared by much research on the "disadvantaged," where the objective is to seek means to reduce the discrepancy in achievement levels between "deprived" and "non-deprived" children.[1]

2. The "Equal Footing" Basis of Coleman's Argument:

At one level -- the "equal footing" level -- Coleman's line of reasoning seems to epitomize logic, common sense, and compassion. It seems to ask only that we give children from "disadvantaged" backgrounds a fair shake -- that through the educational system we educate all children to a point of equality in school achievement so that all groups can compete on equal terms for jobs or future educational opportunities.

However, it is our contention that Coleman's analysis does not go far enough, does not tell the whole story or consider all the evidence, and therefore is misleading and perhaps destructive. It fails to consider either the role of diversity and pluralism in our society or several alternative definitions of the function of schooling. Should schools provide equal opportunities to promote the equal development of all groups and individuals or equal opportunities for the maximum development of each group or individual? Can schools aim to do both?

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[1] The counterpart to Coleman's reasoning about equal educational opportunity exists in the history of "culture-free" test construction, another topic of great relevance to the education of the disadvantaged. Early developers of "culture-free" tests (e.g., Eells et al.,1951) argued that only tests which extracted items distinguishing among groups were free of "bias." The parallel to Coleman's argument is apparent: (1) the proper function of a "culture-free test is to produce equal test scores for different social-class and ethnic groups, (2) if equal scores are not obtained, the fault is that the test (or some kinds of test items) produce the difference. Difference in test scores, ergo, bias in test items. The logical fallacy of this argument is now well-documented (e.g., Anastasi, 1958; Lorge, 1952), but the simple and surface persuasiveness of the argument stalled progress for many years in the study of cultural influences upon intelligence.

3. An Alternative Argument: Equal Opportunity for Maximum Development:

We believe that our data on patterns of mental ability clarify these two alternative and perhaps complementary assumptions regarding the function of education: (1) to provide equal opportunity for equal development, or (2) to provide equal opportunity for maximum development of each group or individual, whether or not group differences remain, enlarge, or disappear as a consequence. These positions are apparently incompatible but need closer examination in the light of empirical evidence.

a. Data on Social class:

From our mental-ability data, what would we predict would happen if we modified the social-class characteristics of all our lower-class families -- elevating the jobs, educations, and housing of the lower-class families in all ethnic groups? Within each ethnic group, we would expect to elevate the mental abilities of the lower-class children to resemble those of the middle-class children in that ethnic group, making them more similar to their middle-class counterparts in that ethnic group in level of ability. In this sense, we would be making groups of children more similar, removing the differences in mental ability associated with differences in social-class position.[2]

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[2] We noted earlier (p. 39) that social-class position produces more of a difference in the mental abilities of Negro children than for the other groups. From this finding, it is possible to speculate that elevating the social-class characteristics of lower-class Negro families would produce a more dramatic increase in the level of the Negro children's abilities than would a comparable change in social-class position affect the children from other ethnic groups.

If we elevated the social-class position of our lower-class families we might produce still another effect which increases the similarity among groups. You will recall that we described an interaction effect between social class and ethnicity in affecting the level of each mental ability, this interaction effect showing that the mental-ability scores of middle-class children from various ethnic groups resembled each other more than the scores of the lower-class children from these ethnic groups. This interaction can be described as a convergence effect, in which the scores of the middle-class children across ethnic groups converge to a greater extent than the scores of lower-class children.

Thus, by elevating the occupations, educations, and neighborhoods of our lower-class families, our data would lead us to expect an increased resemblance of mental-ability levels for children within each ethnic group and, in addition, a convergence of scores of children across ethnic groups.

b. Data on ethnic groups:

To this juncture, our analysis supports the argument for equal educational opportunities for equal development: our data on level of mental ability suggest that elevating social-class characteristics of lower-class families would contribute to a greater degree of equality of development in level of intellectual functioning. Now, what of the alternative conception that the proper function of education is to provide equal opportunity for maximum development no matter what the consequences for the absolute magnitude of group differences? Recall the data on patterns of intellectual functioning indicating that once the mental-ability pattern specific to the ethnic group emerges, social-class variations within the ethnic group do not alter the basic organization associated with ethnicity. This finding suggests that lower-class children whose social-class position is elevated would still retain the distinctive mental-ability pattern associated with their ethnic group. The implication is that no matter what manipulations are undertaken to modify the social-class positions of children within an ethnic group, the distinctive ethnic-group pattern of abilities will remain.

From this set of observations, the question then arises: how can we make maximum educational use of the distinctive patterns of ability the child possesses? We do not have definitive answers to this question, and it forces us to consider the line of future research discussed earlier on matching instructional strategies to the patterns of mental ability (pp. 24 & 50). But assuming we can find some empirical answers to the problems of adapting curriculum to individual differences and *vice versa*, we must accept the inevitable consequence of arranging to capitalize maximally on distinctive patterns of ability: that, in certain areas of intellectual accomplishment, we may not reduce or bring toward equality the differences among various groups but we may actually magnify those differences.

Let us take a specific, if partially hypothetical, case to clarify the "maximum education" and "equal education" arguments. Our evidence indicates (see Figure 1) that young Chinese children have their strongest skill in Space Conceptualization and their weakest in Verbal ability. Conversely, young Jewish children are strongest in Verbal and weakest in Space. Following our principle that maximum matching of instruction and ability for the Chinese children, we may produce proportionally many more Chinese than Jewish architects and engineers -- the Chinese children really bring stronger Space skills to be maximized through instruction than do the Jewish children, and if each group receives maximum training, the Chinese children will surpass the Jewish children in skills basic to architecture and engineering. Conversely, for Jewish children we may through maximum matching of instruction and abilities, produce proportionally many more Jewish than Chinese authors and lawyers. We will not have produced proportionally equal numbers of Chinese and Jews entering these different professions; we will not have put members of these two ethnic groups on an "equal footing" for entering a particular occupation. But can we say that we have produced a socially-destructive outcome by starting with the knowledge of differences in ability patterns and adapting our instructional strategies to this knowledge to produce a maximum match for each child, even if this process results in inequality of certain educational and professional attainments?[3]

4. An Interim Summary:

We challenged Coleman's "equal footing" argument by saying that it did not tell the whole story or use all known data. Some of these data, mainly the effects of social class upon level of mental ability, testify in favor of the argument for equal educational opportunity for equal development. Other data, namely the effects of ethnicity upon patterns of mental ability, testify to the importance of providing equal educational opportunities for the maximum development of groups and individuals, even if inequality of groups occurs as a consequence. Are these arguments contradictory or supplementary? We shall address this final question after we pursue its implications for the definition of the label "disadvantaged."

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[3] At an earlier point in the argument, we referred to the related topic of the development of "culture-free" tests. At this point in the argument, the counterpart topic is that of the difference between "compensatory" and "supportive" educational programs for "disadvantaged." "Compensatory" programs aim to compensate, to make amends, to eradicate symptoms and causes -- to give disadvantaged children what they need to make them like everyone else. In contrast, the aim of what might be termed "supportive" education is to give disadvantaged children what they need and can use maximally in order to learn to cope with and change their particular environments, even if they are made more different from everyone else in the process.

5. Implications for the Definition of "Disadvantaged:"

Let us start with the simplest possible definition of "disadvantaged," i.e., the "not advantaged." Given this definition, one might argue that the "advantaged" have something (or many things) that the "disadvantaged" do not have, that these "have not's" should be given what the "have's" already possess, and then we shall all be equal. Certainly, matters are not that simple.

Defining the "disadvantaged" in terms of differences in social-class position adds some precision to the definition of "not advantaged." It identifies more clearly some of the characteristics on which the "have's" and the "have not's" differ: jobs, education, housing. A social-class definition thus specifies three dimensions of the limited social boundaries within which the lower-class child may move. However, the empirical implications of the social-class definition are not very different in substance from the definition of "not advantaged." We have argued from our data that providing a lower-class family with what a middle-class family has -- better jobs, education, and housing -- will produce levels of mental ability resembling those of middle-class children. We thus provide equal education and social opportunities for equal development.

What happens, however, when we introduce ethnicity into our definition of "disadvantaged?" The consequences now change. It is no longer possible to follow the strategy of giving the "have not's" what "have's" possess; changing ethnic membership cannot be accomplished through social decree of federal action programs. We know ethnic groups differ in patterns of ability no matter what the social-class level within the ethnic group, and our educational problem now becomes that of providing equal educational opportunity to all ethnic groups to maximize their development, even at the expense of magnifying differences among the groups.

The point for defining the term "disadvantaged" is clear. The many different meanings assigned to this label may have accumulated arbitrarily according to the idiosyncratic choices of the various users of the term. But it is not merely a matter of whose definition sounds most convincing, or elegant, or compassionate. Each definition brings different empirical results and suggests different implications for educational policy and social action. We cannot afford this confusion; we are forced to be clearer about our definitions and their educational and social consequences.

6. A Final Summary:

Are equalization and diversification necessarily incompatible goals? We do not believe so. If accelerating the feasible gains in jobs, education, and housing of lower-class families accelerates the gains in intellectual development of their children and reduces the difference in intellectual performance between social-class groups, we can all agree on the desirability of this outcome. On the other hand, if recognizing the particular patterns of intellectual strengths and weaknesses of various ethnic groups and maximizing the potential power of these patterns by matching instructional conditions to them makes the intellectual accomplishments of different ethnic groups more diverse, we can all accept this gain in pluralism within our society. Thus, if lower-class children now perform intellectually more poorly than middle-class children -- and it is clear that they do -- and lower-class status can be diluted or removed by a society truly dedicated to doing so, this gain in equalization seems one legitimate aim of education. If the maximum educational promotion of particular patterns of ability accentuates the diverse contributions of different ethnic groups, this gain in pluralism seems another legitimate aim of education.

Perhaps this asks no more than to change what is bad and changeable in education and society (resulting perhaps in greater equalization) and to use maximally what is good in education and society (resulting perhaps in increased diversity). Logic, and the empirical evidence, endorses both conclusions.

IV. Toward a New Definition of the Disadvantaged.

We began this paper by accepting the common definition of disadvantaged status based on gross environmental characteristics: social class and ethnicity. This definition of disadvantage is strictly environmental and pre-assigned, ignoring child characteristics completely. It is a gross classification of children according to group membership only and what we can learn about children using this definition is usually expressed in terms of group tendencies (although we have suggested some techniques for moving from group data to individual analysis). Our suggestions for future research, both of developmental origins and school-based studies, direct us to some necessary refinements and extensions of these gross classifications.

Our recommendations for studies of developmental origins or environmental process analyses move us strongly in the direction of more precision and detail about environmental circumstances. Developmental research demands that a new definition of disadvantaged status be based on a much more refined assessment of environmental circumstances. Such an assessment would proceed far beyond the group characteristics we have dealt with in the past, specifying environmental circumstances which are closely articulated with developmental processes and which vary considerably within and across social-class and ethnic lines. Particular clusterings of environmental circumstances known to be related to developmental processes would lead to identification of disadvantaged status in more complex but precise terms.

Our discussions of school-based research suggest that the disadvantaged status be expanded to include characteristics of the child. We refer now to assessments of children which are intimately connected with instructional objectives and procedures. From this point of view, a multiplicity of child attributes would have to be used to assess readiness for learning a variety of school tasks. Such measurements of readiness would give much power and operational substance to the concept of disadvantage.

We are therefore suggesting that an important advance in definition could be made by joining more precise descriptions of environments with instructionally-based assessments of child characteristics. Beginning with environmental characteristics and then assessing children's learning patterns would lead to one grouping of those we would class as disadvantaged; the other direction of attack, starting with child characteristics and then assessing environments, would lead to another grouping. The usefulness and desirability of each direction of approach must await both empirical and practical assessment. In either case, the lesson is clear: a new definition of disadvantaged should include psychologically-meaningful statements about the environment and the child. The complexity of such statements will reflect a plethora of constructs and if-then statements about child-environment interactions but will be a realistic reflection of the diversity and individuality of children and the lives they lead.

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DISCUSSION

Following the Stodolsky-Lesser Report

Dr. Caldwell: Dr. Lesser, how do you interpret your discovery that differences in pattern of mental performance varied according to the ethnic group, and not according to social class?

Dr. Lesser: It's clearly the most startling finding of our study. In most literature on this subject, social class differences are assumed to have the dominant influence, submerging all other factors. In contrast, we discovered that it's the child's cultural group which seems to have the more powerful influence in generating and reinforcing the pattern of his mental abilities, which pattern is not further altered by changes in social class. Perhaps when we've taken a much closer look at families living under different ethnic and social conditions, we will find which variables make up the generating condition for distinctive patterns of mental ability.

Dr. Birch: I have a problem in looking at the data that you've presented. I for one don't find any logical connection between the data which has focused on end product scores, that is, on the achievement of children in a certain mental task at a certain point in time and the antecedent process which constituted the origin of differences in learning ability. In other words, it's quite clear to me that, even before the children go into school, there are very great differences in the patterns of performance between children from different ethnic backgrounds; but, what's not clear to me are the factors which have brought about these differences. Now can we, without further questioning, make a straightforward equation of these antecedent factors with our conventional notion of learning ability?

Dr. Lesser: A tentative answer--and it's only tentative at this point--is that, in looking carefully at the home environment of ethnically different families, we will find different patterns of value: in one family one particular expression of intellect might be more highly valued than another expression; and in another family of different ethnic origin a different expression of intellect might be valued; in both families priority being attached to some forms of intellect at the expense of other forms.

Dr. Birch: You are saying, then, that the families have done something to contribute to the end product scores of their children on intelligence tests.

Dr. Lesser: I am saying that the family is one contributor, a contributor by the way which we can get hold of and look into. For my edification, perhaps you can expand on what you think the other contributors might be and how we might approach them empirically.

Dr. Birch: I plan to do just that in my presentation this afternoon; but right now let me tell you what puzzles me. In a recent study which my wife and I carried out on a group of disadvantaged Puerto Rican infants, we discovered that, by the age of three, these children exhibited I.Q.s which, in terms of gross achievement, were the same more or less as those exhibited by children of the same age from the white middle class. This finding had been expected, since all of the infants had been screened for excellence in health, all lived in relatively good housing conditions, and all came from families which were more or less stable and intact. But what surprised and puzzled us was our discovery that the Puerto Rican children differed remarkably from the white children in their style of making correct or incorrect responses in the I.Q. exams. For example, when failing to make a correct response, no Puerto Rican youngster tended to explain his failure either by rationalizing his motivation or by remarking on his abilities. In contrast, the white middle class children would invariably make such rationalizations and remarks. When, on the other hand, the white middle class children made a correct response, they persistently failed to remark on features in their prior experience which might have contributed to their performance. None included in their response such comments as: I have blocks like these at home; or I like the chain blocks. In contrast, whenever they failed to answer correctly, they had a lot to say: for example, I left my muscles at home; or I don't like to do this; or my mother didn't teach me this yet; and so on. On the other hand, whether right or wrong in their response, the Puerto Rican youngsters gave either a simple negative or engaged themselves in irrelevancies. Having observed these differences in the styles of children, who perform equally well at age three, I wonder now whether they can produce fundamental differences in achievement at age six. If they do, then we will be forced to re-examine our simple equating of ability with achievement.

Dr. Stodolsky: I might even accentuate your point by referring to Katrina Hersch's study. In looking into the problems of poor readers, she found that one of the salient factors to observe was the style of the children in the test situation. Katrina did this herself by observing how each child rationalized its performance in terms of some abstract ability or by way of defending itself in erring with recollections of its home life. Now it may very well be that these styles do not produce significant differences in achievement at age six, but merely persist and exert some modifying influence.

Dr. Birch: In your review of the literature, then, you have found no evidence from which to infer that divergence in achievement at one point in time among children who exhibited equal achievement at an earlier point does not depend on a divergence in style. I myself have come across only one piece of evidence to the contrary: Dr. Upsilanti has written a paper having to do with the results of her analysis of Binet item-response from a group of lower class children. She compared their MA scores to the equivalent scores of children from a normative population and discovered remarkable differences in the way the children from the lower class achieved a certain MA score as compared to the way children from the normative class achieved the same MA. Now this study was confined to the effects of style alone and showed that different styles of responding were more than persistent factors.

Dr. Lesser: Let me add that in our publication we indicated such variables as different styles of cognition, motivation and personality. For example, during our research we observed Chinese children from the lower and middle classes as they did a reasoning task. We saw that each child looked at the task for a while, as if going over possible moves in his head and plotting the correct one. This delay-time or hesitation seems to result in something which might have qualitative effects on the performance of Chinese children. In contrast, no such deliberation was observed on the part of the Puerto Rican children when making their moves. Instead, each Puerto Rican child locked himself into a particular problem-solution which was irreversible. From this contrast we concluded that the factor of reflectivity in the thought-style of the Chinese child might work to his advantage in arriving at the same level of performance as the Puerto Rican child.

Dr. Deutsch: I think one of the problems that hasn't been solved is the distinction between process and product. When we are talking about cumulative styles, we are in a sense thinking of a process; but when we are measuring the effects of one of these styles, we are in a sense treating a product. Again, when we talk about the demands of a particular curriculum, we would like to think of it as a process; but, in reality, we don't treat it that way. For example, we have a certain series of scales called the probability inventory in which we try to determine how many colors or letters a child can name in kindergarten. All this points to products. Yet, in examining curriculum as a process, we presuppose that our findings from such probability inventories are the same as a knowledge of the antecedent process; when, in point of fact,the findings only indicate certain products. So, with this confusion of products with their antecedent process, it's no wonder we never really know why, under the testing or learning situation, a child produces the incorrect answer. To avoid some of this confusion, I think one approach is available in the kind of model which takes up one stimulus property to learning at a time. Despite all its inadequacy such a model would help us immensely in devising new curriculum and teaching approaches. Another approach is at hand in certain theoretical orientations. The Jensen verbal mediation models, for example, have impressed me very much. Such models can help us in understanding why disadvantaged children, and especially disadvantaged Negro children, can be penalized even more on performance tests than on verbal tests. According to one Jensen model, the threshold of Negro children for verbal mediation may be higher than that of other children. As a consequence, they may need artificial verbal mediators to solve the performance tests, whereas children from homes, which have already supplied them with the requisite mediators, don't need the artificial kind of mediators. A third approach has to do with the stimulus properties of the child's early environment, which properties appear, from Bud White's work, to influence the later development of advanced mental skills.

Dr. Lesser: How do you draw the distinction between stimulus and response? Moreover, of what value is this distinction since the response of a child often turns into a stimulus for further response?

Dr. Deutsch: I think the distinction has great merit: If you follow it logically one way or the other, and look first for the stimulus influences, then what you are, in fact, assessing is the surrounding of the child in all its aspects as the generating condition for his development. And if you turn about and look at the child himself, your assessments hinge on the kinds of factors which have been treated rather extensively already. I myself have maintained in an unpublished paper that the basic process through which we come to know our world is strongly influenced by our early experience of an environment which is a compound of biological, psychological and social factors. In the same paper, moreover, I contend that our theories of early childhood experience rest more securely on an understanding of the stimuli of the environment than they do on conjectures as to internal responses and reinforcements.

Dr. Birch: I'd like to add a few comments about the distinction which Dr. Deutsch has just drawn. About twenty years ago, Bittement and I became concerned with theories of learning, especially insofar as these theories had to do with organic mechanisms for learning. At that time, we contended in a series of papers that any learning of a fundamental kind reflects a process of afference in the human organism. We called this process integration of sensory data or sensory integration. Now, it's important to note the radical difference between this notion of sensory integration and the notion of a stimulus becoming a response and of this latter, in turn, becoming another stimulus. In other words, according to the latter notion, any response at one point of time that comes from the child is a product of afference at some earlier time through its sensory organs. Under such conditions, the response is supposed to act in the present moment as a recurrent stimulus which, in some way, alters the process of afference. We should note, however, some difficulties in this notion. For one thing, if we suppose that a response is always some passive movement of a particular afferent organ, for example, of a stimulated motor nerve or something of this sort, then a response in and by itself can never become something active so as to provide the stimulus for the motion of some other afferent organ at a later time. As a consequence of this supposition, no account can be forthcoming to explain the process in which a learning pattern is definitely fixed in the organism and recalled. For another thing, a great deal of work on reading ability has operated under the assumption that, if you simply give a child enough practice in the discrimination of visual forms and reinforce this kind of practice by having him say: this is a house, this is a dog, and so on, then this method will have a positive influence on his subsequent development as a reader. It's important to note, however, that by this method you may stimulate afferent organs in the child which are completely irrelevant to the organs which are active in the more complex task of reading itself, which latter organs are so completely integrated in the process of reading that the child quickly discerns: this is a house, but a house in this particular way; and this is a dog, but when it's this way it's dog-A and when it's that way, dog-B; and so on. In short, the whole theory of stimulus-response does not give us any clear and certain knowledge as to whether an afferent organ which has been stimulated at one point in time is the proper one for the learning of a specific task at a later time.

Dr. Gordon: Before we go any further, I think Dr. Wortis had something to say.

Dr. Joseph Wortis: Thanks. I feel impelled to deliver a medium-sized speech in response to what I think Dr. Deutsch was emphasizing. As you know, we were called together at the suggestion of the Office of Education which shares with a number of other key governmental agencies the common concern with problems of poverty, and especially with the education of the impoverished. From listening to the present discussion and from my experience with other conferences of this kind, I've concluded that we are very much concerned with relieving children of the effects of poverty, but that we're rather reluctant to deal with poverty itself. This, then, is the dilemma: it's very easy to become so preoccupied with the subtleties of educating the impoverished that we sometimes lose sight of the basic ingredient in this problem which is, quite simply, the existence of poverty. If I understood Dr. Deutsch correctly, she wants us to see the stimulus-side of the child's experience in all its complex interrelationships. However, in doing this, we mustn't allow the complex interactions of subject and object to obscure the basic fact that the life of these children is one of continuous impoverishment. Now, I think some of the most basic observations in this complex of interactions are simple to the point of sounding like platitudes. For example, acting the part of one of the characters in Sherman Licktum's stories, I might deliver very wisely the ponderous remark: "It is much better to be rich and healthy than to be poor and sick." I do think, however, that we must observe how much better it is for a child to be exposed to the good things of life, and how much healthier it is for a child to come from an intact family and have good interrelationships with adults than it is to be deprived of all these things. Perhaps, I'm making a leap to the conclusion of our deliberations rather than waiting for it to come from our discussion of research into the problems of poverty. But I think it's sometimes wise to begin with conclusions, because, then, we are in a position to see if they can be substantiated. It seems evident to me that the educational process, whatever it is in itself, does implement in the human species a chosen interaction between the adult who possesses the culture of the society and the children who are to inherit all this. As a consequence, the usual pattern of interaction shows a transmission of the basic intellectual elements in the early years of the child's life. But, where poverty has deprived the child of the opportunity for this kind of interaction because the parents are either non-existent or working all the time so the ordinary stimuli to learning, such as toys, and games and speech, are absent; then we shouldn't be surprised in discovering that no transmission of intellectual patterns has occured. Moreover, where motivation doesn't exist because the parents' prospects of employment are so poor that moral values deteriorate and rewards for certain behavior vanish; then we shouldn't be puzzled in finding a breakdown altogether in the normal development of interest, incentives and motivation which make up the bask preparation for the child's learning process in school. If these basic observations apply to our present task--and I think they do--, then to me the concrete task seems one of defining reform measures for the family structure in general or of figuring out surrogates for infeebled family organizations in the form of increased responsibilities on the part of schools. We must either change the total organization of families throughout society or take over the education of disadvantaged children at a very early stage. This latter alternative, by the way, would entail more than an increase in the scope of the three-R's; it might even be extended into all spheres of child development, including sports, summer camp activities, and so on. Again, I have brought out this basic observation because I do think that any inquiry into the complexities of poverty have to take place within this simple constellation of influences. Otherwise, a disproportionate emphasis on some minor subtlety will carry us away from a much needed examination of the overall picture.

Dr. Birch: I think we all must agree with what Dr. Wortis has said. But I also think we've got to be practical and examine three very complex matters. First of all, conditions of poverty with all its attendant ills have produced a generation of children who will be going into school very soon or who are already in school. We know for sure they all have basic handicaps which will work against them profiting from their school experience. Now, whether or not this situation can be modified, either by changing the present organization of schools or by altering the antecedent experience which the children bring into school, is one matter we have to focus on. If, on the other hand, we remain at too general a level and seek to end poverty all at once, we will have abandoned a whole generation of children to the evil effects of poverty. With an eye to this complex matter, it seems to me that our task is one of careful remediation or of removing the negative effects which show up in children who have been exposed to the most intolerable conditions of life. A second matter we must attend to is that of children being born and making up another generation who will all face handicaps in terms of physical growth and optimal school performance. In solving this second problem, I think we have to make some hard and fast decisions whose primary goal will be to arrest the process which leaves some children at a disadvantage in comparison to others. The third matter we have to concentrate on is that of removing the conditions of labor shortage, poor health habits and ill-defined welfare services and also preventing their reappearance. Now, in looking to these matters, I feel that we at this conference need to focus on the first two, remediation and rehabilitation.

HEALTH AND THE EDUCATION OF SOCIALLY DISADVANTAGED CHILDREN

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INTRODUCTION

There is some danger that a necessary and entirely warranted focusing of attention upon social and cultural factors which may effect educational achievement can cause us to neglect certain bio-social factors which through a direct or indirect influence on the developing child affect his primary characteristics as a learner. Such a danger is exaggerated when a fragmentation of administrative concern with health and with education exists. It becomes possible for the educator and the sociologist to concentrate quite properly on features of curriculum, familial environment, motivation, cultural aspects of language organization, and the patterning of preschool experiences. Such a concentration is entirely fitting. However, it becomes one-sided and potentially self-defeating when it takes place independently of, and without detailed consideration of the child as a biological organism. To be concerned with the child's biology is not to ignore the cultural and experiential opportunities which may affect him. Clearly, to treat such organismic factors as a substitute for experiential opportunity[1] is to ignore the intimate interrelation between the biology of the child and his environment in defining his functional capacities. However, it is equally dangerous to treat cultural influences as though they were acting upon an empty organism and to fail to recognize that effective environment is not identical with objective situations[2] but is rather the product of the interaction of organismic characteristics with the objective opportunities for experience. The child who is apathetic because of malnutrition, whose sequence of prior experiences may have been modified by acute or chronic illness, whose selectivity as a perceiver and organizing ability as a learner may have been affected by previous exposure to risks of damage to the central nervous system, cannot be expected to respond to opportunities for learning in the same way as does a child who has not been exposed to such conditions. The assumption that an increase in objective opportunities for learning, though entirely admirable in itself, will overcome such biologic disadvantage is unsupported by existing knowledge.[3,4]

If children have been exposed to exceptional conditions of risk for biologic insult, at least two paths of concern may be defined. The first is that in the current generation such children must be identified and not merely additional but special educational opportunities effective for them must be provided. Moreover, since no socially deprived group can be considered to be homogeneous for organismic disability, groups of children deriving from such backgrounds must be differentiated from one another in order, most effectively, to identify meaningful subgroups for purposes of remedial, supplemental and habilitative education. The second path is one that must concern itself with future generations. If conditions of risk to the organism can be identified, and if the conditions productive of such risk can be changed for the better, an opportunity exists through the application of public health principals and of current bio-social knowledge significantly to reduce learning handicap in future generations.

We wish to argue, therefore, that a concern with the education of the socially disadvantaged cannot in good conscience restrict itself to the provision either of equal or special educational and preschool opportunities for learning. Rather, it must concern itself with the totality of factors contributing to educational failure, among which the health of the child is a variable of primary importance.

To advance such an argument is not new. The basic relationship between poverty, illness and educational failure has long been known as has the fact expressed by James[5] that "poverty begets poverty, is a cause of poverty and a result of poverty." What is new is the nature of the society in which such an interaction occurs. As Galbraith has put it "to secure each family a minimum standard, as a normal function of society, would help insure that the misfortunes of parents, discerned or otherwise, were not visited on their children. It would help insure that poverty was not self-perpetuating. Most of the reaction, which no doubt would be almost universally adverse, is based on obsolete attitudes. When poverty was a majority phenomenon, such action could not be afforded... An affluent society has no similar excuse for such rigor. It can use the forthright remedy of providing for those in want. Nothing requires it to be compassionate. But it has no high philosophical justification for callousness."[6]

The pertinence of Galbraith's concern as it applies to the health of children, particularly those in the non-white segments of our population, is underscored first by the fact that according to the Surgeon General Stewart[7] the United States standing with respect to infant mortality has been steadily declining with respect to other countries in the world. Though we are the richest country our 1964 infant mortality rate of 24.8 per 1000 live births causes us to rank fifteenth in world standing. Had we had Sweden's rate, the world's lowest, approximately 43,000 fewer infants would have died in that year. Of particular pertinence to the problem of social disadvantage is the fact that the mortality rate for non-white infants is twice as high as that for whites with the highest rates for the country as a whole in the east south central states, Kentucky, Tennessee, Alabama and Mississippi. Wegman in reviewing these figures has noted that "Mississippi again has the dubious distinction of having the highest rate (infant mortality)...more than twice that of the lowest state."[8] Most of this difference could be related to the higher Negro population of Mississippi.

The data on infant mortality has been extended to other features of child health by Baumgartner[9] and by Densen and Haynes.[10] These workers have pointed out that although detailed and careful documentation of the "degree and magnitude of the health problems" of the Negro, Puerto Rican, and Indian groups are not readily available, a strikingly dangerous picture may be pieced together as a montage from various public health statistics, research studies, and occasional articles. The picture is striking, not merely because it shows these minority groups to be at a significant health disadvantage with respect to the white segment of the population, but because it indicates a secular trend in the disparity between these groups in the degree of relative health disadvantage to which the non-white groups are subject. Thus, while in 1930 twice as many non-white as white mothers died in childbirth in 1960 "for every white mother who lost her life in childbirth, four non-white mothers died."[9] In 1940 the number of non-white mothers delivered by poorly trained midwives was fourteen times that for white mothers, a discrepancy that rose to twenty-three times as great by 1960. As Gold[11] has pointed out when the general overall death rate for mothers in childbirth had reached an alltime low of 3.7 per 10,000 live births, this change was largely due to the reduction of the mortality rate among white mothers to 2.6. Non-white mothers had a death rate four times as great, 10.3, a rate characteristic of white mothers two decades earlier. In generalizing these findings Baumgartner has suggested "that the most advantaged non-white family has a poorer chance of having a live and healthy baby than the least advantaged white family."[9] And Densen and Haynes considering ethnic differences in health over the whole life span have suggested "that health differences are inextricably interwoven with cultural, economic, educational and other variables...(that) the important challenges facing the health professions in the United States...is narrowing the gap (and that) the highest priority are research in health manpower, organization, delivery and utilization of health services."[10]

Given this general overview of the currently existing differential in the condition of health of the non-white and white segments of the American population it appears essential that in our concern with educational disadvantage we concurrently recognize the excessive risk of ill-health relevant to educational handicap that exists in the children with whose welfare and education we are concerned. To this end we shall explore certain selected features of health that are directly relevant for education and consider the degree to which they serve to differentiate the population of socially disadvantaged children from other children in our country.

PREMATURITY AND OBSTETRICAL COMPLICATIONS

Few factors in the health history of the child have been as strongly associated with later intellectual and educational deficiencies as prematurity at birth and complications in the pregnancy from which he derives.[12] Although a variety of specific infections, explicit biochemical disorders, or trauma may result in more clearly identified and dramatic alterations in brain function, prematurity together with pre and perinatal complications most probably are factors which most broadly contribute to disorders of neurologic development.[13,14] It is, therefore, suitable for us to begin a more detailed consideration of health factors which may contribute to educational failure by an examination of prematurity and the factors associated with it.

Prematurity has been variously defined either by the weight of the child at birth, by the maturity of certain of his physiologic functions, or by gestational age.[15] Independently of the nature of the definition in any society in which it has been studied, prematurity has an excessive representation in the lower social strata and among the most significantly socially disadvantaged. In seeking to analyze the significance which may attach to an excessive representation of prematurity in any social group it is essential to bear in mind that its presence is simultaneously indicative of two separate conditions of risk. In the first place fetuses that are primarily abnormal and characterized by a variety of congenital anomalies are more likely to be born before term than are normal fetuses. Second, infants who are born prematurely, even when no congenital abnormality may be noted, are more likely to develop abnormally than are infants born at term. Thus, Baumgartner has noted that follow-up studies have "indicated that malformation and handicapping disorders (neurological, mental, and sensory) are more likely to be found among the prematurely born than those born at term. Thus, the premature infant not only has a poorer chance of surviving than the infant born at term, but if he does survive he has a higher risk of having a handicapping condition."[16] One consequence of this association between prematurity and neurological, mental, sensory and other handicapping conditions is the excessive representation of the prematures among the mentally subnormal and educationally backward children at school age.[12,17]

Baumgartner[16] has presented the distribution of live births by birth weight for white and non-white groups in the United States for 1957. The data reflecting this distribution are presented in Table 1. For the country as a whole 7.6 percent of all live births weighed 2500 gms. or less. In the white segment of the population 6.8 percent of the babies fell in this low birth weight range. In contrast 12.5 percent of the non-white infants weighed 2500 gms or less, with their frequency at all levels of low birth weight being twice as great as that of white infants. Baumgartner has attributed the high incidence of prematurity among non-whites to the greater poverty of this group. The studies of Donnelly, et al.,[18] in North Carolina, of Thomson[19] in Aberdeen

Scotland, and of Shapiro, et al.,[20] in New York suggest that a congery of factors including nutritional practices, maternal health, the mother's own growth achievements as a child, as well as deficiencies in prenatal care and birth spacing and grand multiparity interact to produce group differences between the socially disadvantaged and more advantageously situated segments of the population.

It has sometimes been argued that the excess of low birth weight babies among the socially disadvantaged is largely a consequence of ethnic differences. It has been argued that Negroes "naturally" give birth to smaller babies and that the excess of prematurity merely reflects this phenomenon. However, the high association of prematurity with social class in an ethnically homogeneous population such as that in Aberdeen,[19] the finding of Donnelly, et al., that within the Negro group higher social status was associated with reduced frequency of prematurity,[18] the findings of Pakter, et al., that illegitimacy adds to the risk of prematurity within the non-white ethnic group,[21] and the suggestion made by Shapiro, et al., that a change in the pattern of medical care for the better reduces the prevalence of prematurity,[20] all make the ethnically based hypothesis of "natural difference" difficult to retain.

If gestational age is used instead of birth weight as an indication of prematurity, the non-whites are at an even greater risk than is the case when birth weight has been used. The data in Table 2 indicate that 18.1 percent of non-white babies born in New York City during 1958-59 had a gestational age of 36 weeks or less in contrast to a rate of 8.5 percent for live-born white babies.

Both the data on birth weight and the data on gestational age leave little doubt that prematurity and its attendant risks are excessively represented in the non-white segment of the population. Moreover, an examination in detail of regional data such as that provided by Donnelly, et al., for hospital births in university hospitals in North Carolina[18] indicate clearly (Table 3) that in that community the most advantaged non-white has a significantly greater risk of producing a premature infant than the least advantaged segment of the white population.

When the survival of premature infants is considered,[22] it is clear that for equal degrees of prematurity non-white infants have a somewhat better chance for survival during the first month of life. However, during the remainder of infancy this likelihood is reversed particularly for infants weighing between 1500 and 2500 gms. at birth. Viewing these data, Baumgartner has concluded that, "this observation strongly suggests that inadequate medical care, inadequate maternal supervision, inadequate housing and associated socio-economic deprivations are exerting unfavorable influences on the later survival of those non-white babies who initially appear the more favored. It is apparent that socio-economic factors not only influence the incidence of low birth weight in all ethnic groups, but greatly influence survival after the neonatal period."[16]

If the low birth weight and survival data are considered distributively rather than categorically, it appears that the non-white infant is subject to an excessive continuum of risk reflected at its extremes by perinatal, neonatal, and infant death, and in the survivors by a reduced functional potential.

THE BACKGROUND OF PERINATAL RISK

Having considered the increased risk attaching to the socially disadvantaged child at birth, we can now proceed to analyze the social distribution of some of the factors which appear to affect this condition.

Clearly, the risk of having a premature baby or a complicated pregnancy and delivery begins long before the time of the pregnancy itself. A series of studies carried out in Aberdeen,Scotland on the total population of births of that city[19,23,24] have indicated that prematurity as well as pregnancy complications are significantly correlated with the mother's nutritional status, height, weight, concurrent illnesses, and the social class of her father and husband. Although the relation among these variables is complex, it is clear that the women born in the lowest socio-economic class and who have remained in this class at marriage were themselves more stunted in growth than other women in the population, had less adequate dietary and health habits, were in less good general health, and tended to be at excessive risk of producing premature infants. The mother's stature as well as her habits were determined during her childhood, tended to be associated with contraction of the bony pelvis,[23] and appeared systematically related to her risk condition as a reproducer. In analyzing the relation between maternal health and physique to a number of obstetrical abnormalities such as prematurity, caesarean section and perinatal death, Thomson (Table 4) has shown each of these to be excessively represented in the mothers of least good physical grade.[25]

The finding of a relation between the mother's physical status and pregnancy outcome is not restricted to Scotland. Donnelly, et al., in his study of North Carolina University hospital births has shown a clear distribution of height with social class. In Class I (the most advantaged whites) 52 percent of the women were less than 5 feet 5 inches tall. In contrast in social class IV (the least advantaged non-whites) 75 percent of the women were under 5 feet 5 inches in height. The proportion of shorter women increased consistently from Classes I to IV and within each class the incidence of prematurity was higher for women who were less than 5 feet 3 inches tall. Moreover, within any height range the least advantaged whites had lower prematurity rates than the most advantaged non-whites. Thus in the least advantaged whites less than

5 feet 3 inches tall the prematurity rate was 12.1 percent as contrasted with a rate of 19.6 percent for the non-whites in the same height range. In the tallest of the most disadvantaged whites the rate was 5.6 percent whereas in non-whites of the same height range who were least disadvantaged the prematurity rate was 10.1 percent.[18]

The physical characteristics of the mother which affect her efficiency as a reproducer are not restricted to height and physical grade. As early as 1933 Mellanby while recognizing that "direct and accurate knowledge of this subject in human beings is meagre," asserted that nutrition was undoubtedly "the most important of all environmental factors in childbearing, whether the problem be considered from the point of view of the mother or that of the offspring."[26] It was his conviction that the reduction of a high perinatal mortality rate as well as of the incidence of maternal ill health accompanying pregnancy could effectively be achieved by improving the quality of the diet. Acting upon these views he attempted to supplement the diets of women attending London antenatal clinics and reported a significant reduction in morbidity rates during the puerperium.

Although Mellanby's own study is difficult to interpret for a number of methodologic reasons, indirect evidence rapidly came into being in support of his views. Perhaps the most important of these was the classical inquiry directed by Sir John Boyd-Orr and reported in Food, Health and Income.[27] This study demonstrated conclusively that the long recognized social differential in perinatal death rate was correlated with a dietary differential, and that in all respects the average diet of the lower income groups in Britain was inadequate for good health. Two years later McCance, Widdowson and Verdon-Roe[28] confirmed the Boyd-Orr findings in a meticulous study of the individual diets of 120 pregnant women representing a range of economic groups ranging from the wives of unemployed miners in South Wales and Tyneside to the wives of professionals. The diet survey technique which they used and which has, unfortunately, been rarely imitated since, was designed to minimize misreport. The women were given a balance scale and printed instructions on how to weigh and keep a record of all food eaten for the period of one week. Lower class women were, in addition, visited individually in their homes every day and their day's entries inspected and discussed with them to increase their accuracy. The results of the survey showed that there was wide individual variation in the intake of all foods which related consistently neither to income nor to intake per kilogram of body weight. But when the women were divided into six groups according to the income available for each person per week, the poorer women proved to be shorter and heavier and to have lower hemoglobin counts. Moreover, though economic status had little effect on the total intake of calories, fats and carbohydrates, "intakes of protein, animal protein, phosphorus, iron and Vitamin B_1 rose convincingly with income." The authors of the study offered no conclusions about the possible outcome of the pregnancies involved, but the poorer reproductive performance of the lower class women was clearly at issue. For as they stated, "optimum nutrition in an adult implies and postulates optimum nutrition of that person as a child, that child as a foetus, and that foetus of its mother."

A second body of indirect data supporting Mellanby's hypothesis derived from data of animal studies on the relation of diet to reproduction. These studies typified by the series begun by Warkany[29] demonstrated that pregnant animals maintained on diets deficient in certain dietary ingredients produced offspring suffering from malformation. Thus, it appeared that a diet which was adequate to maintain maternal life and reproductive capacity could be inadequate for normal fetal development. In short, the fetus was not a perfect parasite and at least for some features of growth and differentiation could have requirements different from those of the maternal host.

Beginning with these studies and the interest they provoked, the literature abounds in investigations on the relation between dietary practices in the mother and the outcome of her pregnancy. It would divert us from the main line of our inquiry to consider each of these studies in detail. However, Duncan, Baird, and Thomson[30] in surveying these studies as well as the wartime experiences in Britain have argued convincingly that the fall in stillbirth and neonatal death rate could only be attributed to a reduction in poverty accompanied by a scientific food rationing policy. Certainly there was no real improvement in prenatal care during the war when so many medical personnel were siphoned off to the armed forces. Furthermore, the improvement took place chiefly among those deaths attributed to "ill defined or unknown" causes -- that is among those cases when low fetal vitality seems to be a major factor in influencing survival -- and these types of death "are among the most difficult to influence by routine antenatal practice." Of all the possible factors then, nutrition was the only one which, as Garry and Wood wrote in 1945,[31] improved during the war years. It was this fact which led Thomson[32] to remark that the result was "as a nutritional effect" all the more convincing "because it was achieved in the context of a society where most of the conditions of living other than the nutritional were deteriorating."

At about the same time that the National "feeding experiment" was going on in the British Isles, a similar, though more controlled experiment investigating the effects of close nutritional supervision during pregnancy, was being carried out by Dr. K. Utheim Toverud on the continent of Europe.[33] In 1939 Dr. Toverud set up a health station in the Sagene district of Oslo to serve pregnant and nursing mothers and their babies. Though war broke out shortly after the station was opened, and it became progressively more difficult to get certain protective foods, an attempt was made to insure that every woman being supervised had the recommended amounts of every essential nutrient, through the utilization of supplementary or synthetic sources when necessary. Cod liver oil was used as a source of Vitamins A and D, brewer's yeast to provide B vitamins, and synthetic ascorbic acid to substitute for scarce natural sources. Because of the shortage of meat -- the principal source of protein was dried fish -- iron salts were used to provide additional iron. In spite of food restrictions which became increasingly severe toward the end of the war in 1943-44, the prematurity rate among the 728 women who were supervised at the station never went above the 1943 high of 3.4% averaging 2.2% for the period 1939 to 1944. Among the unsupervised mothers the 1943 rate was 6.3% and the average for the period 4.6%. In addition, the stillbirth rate of 14.2/1000 for all women attending the health station was half that of the women in the surrounding districts.

Meanwhile, even as the British and Norwegian feeding experiments were in progress, there were some hopefully never-to-be repeated starvation experiments going on elsewhere; and when they were reported after the war, the childbearing experiences of various populations of women under conditions of severe nutritional restriction were to provide evidence of the ways in which deprivation could negatively affect the product of conception, just as dietary improvement appeared able to affect it positively.

Smith,[34] for example, studying infants born in Rotterdam and the Hague during a delimited period of extreme hunger brought on by a transportation strike, found that the infants were shorter and lighter (by about 240 grams) than those born both before and after the period of deprivation. Significantly enough Smith also found that those babies who were five to six month fetuses when the hunger period began appeared to have been reduced in weight as much as those who had spent a full nine months in the uterus of a malnourished mother. He was led to conclude from this that reduced maternal caloric intake had its major effect on fetal weight beginning around the sixth month of gestation. Antonov's study of babies born during the siege of Leningrad[35] confirmed the fact of weight reduction as well as Smith's observation that very severe deprivation was likely to prevent conception altogether rather than reduce the birth weight. Antonov found that during a six month period which began four months after the start of the siege, there was an enormous increase in prematurity as judged by birth length -- 41.2% of all the babies born during this period were less than 47 cm. long and fully 49.1% weighed under 2500 grams. The babies were also of very low vitality -- 30.8% of the prematures and 9% of the full term babies died during the period. Abruptly, during the latter half of the year, the birthrate plummeted -- along with the prematurity rate. Thus, while 161 prematures and 230 term babies were born between January and June, 1942, five prematures and 72 term babies were born between July and December. Where information was available it suggested that the women who managed to conceive during the latter part of the year, when amenorrhea was widespread, were better fed than the majority, being employed in food industries or working in professional or manual occupations which had food priorities. It was Antonov's conclusion from his own data that while the fetus might behave for the most part like a parasite, "the condition of the host, the mother's body, is of great consequence to the fetus, and that severe quantitative and qualitative hunger of the mother decidedly affects the development of the fetus and the vitaly of the newborn child."

Long after the war, Dean[36] was able to confirm the Smith and Antonov results with a careful analysis of a series of 22,000 consecutive births at the

Landesfrauenklinik, Wuppertal, Germany, during the years 1937-1948. The report demonstrated again that deprivation produced small infants, and that maximal deprivation produced maximal size reduction -- average weights and lengths at birth being lowest in 1945, the year of the greatest food shortage. But it also became apparent that the babies in this series were not premature -- or that they were not premature to the extent implied by their size -- and that the small reduction in the average duration of gestation was insufficient to account for the degree of weight reduction observed. Thus it appeared to have been demonstrated, even more clearly than before that severe hunger did not merely reduce the mother's ability to maintain the pregnancy to term, but could act directly through the placenta to reduce the growth of the infant.

At the conclusion of the war, the evidence in favor of a relationship between nutritional status in pregnancy and the course and outcome of that pregnancy was broadly suggestive. For all their failures in experimental design, the pre-war and wartime studies and the uncontrolled feeding and underfeeding experiments of the war had raised a number of issues which asked to be explored.

These wartime and post-war analyses leave little doubt of an association between maternal diet and the growth and development of the child in utero. Moreover, they suggest that the nature of the diet is significantly associated with pregnancy course and complications.

It is unfortunate that most of the more recent studies of the relation of maternal nutrition to pregnancy course and outcome have tended to obscure rather than to clarify the issue. Most of these studies, such as the excellently conducted Vanderbilt Cooperative Study of Maternal and Infant Nutrition,[37,38,39] have produced confusing and equivocal findings because of patient selection. Since the women included for study have tended to be those who registered for obstetrical care early in pregnancy the lowest class women were markedly unrepresentative of their social group. As a result, these studies have failed to include the very women who are most central to our concern. What is sorely needed is a detailed study of nutrition and pregnancy course in socially disadvantaged women who came to obstetrical notice far too late to be included in the usual dietary surveys in obstetrical services. The design of such a study and its conduct would not be easy. However, if conducted, it would have one virtue absent in most extant studies -- pertinence.

As has just been suggested in the consideration of the limitations of recent dietary surveys, obstetrical care is markedly different in socially advantaged and disadvantaged segments of the population. A preliminary view of the obstetrical care received by lower-class pregnant women may be obtained from a consideration of Hartman and Sayle's survey of 1380 births at the Minneapolis General Hospital in 1962.[40] This hospital which served medically indigent patients living in census tracts having notably high rates of infant mortality delivered 43 percent of its patients with either no prenatal care or only one third trimester antenatal visit. Of the women who did attend the hospital's prenatal clinic, [illegible] percent made their initial visit during the first trimester, 26 percent in the second trimester and 71 percent in the last trimester. Infant mortality appeared to vary according to prenatal care. The mothers having no prenatal care experienced fetal deaths at a rate of 4 percent, a rate considerably higher than the 0.7 percent fetal death rate for mothers having one or more visits to the prenatal clinic.

A survey by Boek and Boek[41] of obstetric care in upper New York State extends our understanding of the issue. The sample studied was collected through an examination of birth certificates and the 1805 mothers interviewed were grouped according to social class as determined by the child's father's occupation. The amount and type of obstetric care correlated with social class. Mothers in the lowest social classes tended to seek health care later during pregnancy than higher class women. Lower class mothers tended to use a family doctor for both pre- and post-natal care, rather than the obstetric specialists and pediatricians heavily patronized by upper class women. More than twice as many upper class women attended group meetings for expectant parents than did lower class mothers. Lower class women tended to stay in the hospital fewer days than upper class women, and although the former paid lower doctor's bills, they tended to pay higher hospital bills since more higher than lower class families had hospital insurance. Three months after the birth of the child fewer lower class women had received postnatal checkups than upper class women and fewer mothers in the lowest social class had their babies immunized with a triple vaccine or planned to have this done. Ninety-three percent of the mothers in the higher social classes were giving their baby vitamins, although only 83 percent of the lowest class mothers were doing so.

The effects of a good, comprehensive health program on pregnancy losses was studied by Shapiro, et al.,[20] in a comparison of the infant mortality rates for members of the Health Insurance Plan and the general New York City population. Obstetric-gynecology diplomates delivered 72 percent of the HIP babies. Only 24 percent of the general New York population received specialist care, and only 5 percent of non-white babies were delivered by specialists (Figure 1). Because of these radical differences in type of delivery care, the investigators compared the HIP prematurity and perinatal mortality rates only to those New Yorkers who were patients of private physicians. Socio-economic status was judged by the occupation of the father as recorded on birth and death certificates. The data on prematurity for the three year period are presented in Table 5. The white patients who participated in the Health Insurance Plan had their prematurity rate reduced from the 6 percent rate characteristic for their group in the city as a whole to 5.5 percent. This reduction just missed statistical significance at the 5 percent level. In the non-white group the rate was reduced from 10.8 to 8.8 percent, a difference significant at the .01 level of confidence. Within each specific category of physician used, Shapiro found that white deliveries had a far lower perinatal mortality than non-white for the general New York City group (Table 6). General service deliveries had a far greater mortality rate than private physician cases in hospitals for both the white and non-white groups. "Among white deliveries mortality was considerably higher for general service cases than for those under the care of private doctors in each occupation category... This raises the interesting question whether the greater mortality in general service is principally due to factors associated with type of care or the setting in which it is received, or whether the poorer risk women within each occupation class tend to turn to general service."

One example of the type of risk that careful prenatal attention can diminish is shown in Kass's study of bacteriuric pregnant women in the Boston City Hospital prenatal clinic.[42] The investigators originally formulated the study to see if treatment for bacteriuria during pregnancy would have any ill effects on the health of the fetus, but shifted emphasis when they found that bacteriuric women had a dramatically higher rate of infant mortality and prematurity than non-bacteriuric women. Patients diagnosed bacteriuric and adequately treated so that they were non-bacteriuric at term had a 14 percent lower prematurity rate than untreated women (Table 7). Since the incidence of bacteriuria was 6 percent of the pregnant women seen at the prenatal clinic (Table 8), Kass predicted that "it should be possible to lower the total perinatal death rate by about 25 percent and the total prematurity rate by between 10 and 20 percent, simply by screening for bacteriuria and treating it properly."

In view of the potential importance of prenatal care for pregnancy course and outcome and the suggestion that such care is deficient in the lowest socio-economic groups it is important to examine the ethnic distribution of antenatal care. The study of Pakter,[21] though restricted to New York City is representative of conditions that exist on a national scale. His findings reported in Table 8a can be replicated in any urban community having a significantly large non-white population. In rural areas the situation is equally bad. Approximately 38 percent of married Negro mothers and 39 percent of Puerto Rican mothers received no prenatal care during the first six months of the pregnancy. In contrast, only 13 percent of white married mothers were subjected to a similar lack of care.

POST-NATAL CONDITIONS FOR DEVELOPMENT

Densen and Haynes[10] have indicated that many types of illness are excessively represented in the non-white segments of the population at all age levels. Rather than survey each of these conditions in detail we shall select one, nutritional status, as the model variable for consideration. The reason for this selection derives from the fact that a considerable body of evidence from animal experimentation as well as field studies of populations at nutritional risk[4] have suggested a systematic relation between nutritional inadequacy and both neurologic maturation and competence in learning.

At birth the brain of a full-term infant has achieved about one quarter of its adult weight. The bulk of subsequent weight gain will derive from the laying down of lipids, particularly mylen, and cellular growth. Animal experiments on the rat,[43] the pig[44,45] and the dog,[46] have all demonstrated a significant interference in brain growth and differentiation associated with severe dietary restriction, particularly of protein, during the first months of life. In these animals the behavioral effects have been dramatic with abnormalities in some cases persisting after dietary rehabilitation.

The generalization of these data to the human situation is made difficult by the extreme severity of the dietary restrictions. More modest restrictions have been imposed by Widdowson[47] and Barnes.[48] In the latter experiment simple learning was tested both during restriction and after dietary rehabilitation. These indicated some tendency for poorer learning in the nutritionally deprived animals.

Cowley and Griesel[49,50,51] have reported on persistent nutritional deprivation in a parent and two filial generations of rats. Their findings have suggested a cumulative effect of malnutrition on adaptive behavior across generations.

The animal findings as a whole can be interpreted either as suggesting a direct influence of malnutrition on brain growth and development, or as resulting in interference with learning at critical points in development. In either case the competence of the organism as a learner appears to be influenced by his history as an eater. These considerations add cogency to an already strongly held belief that good nutrition is important for children and links our general concerns on the relation of nutrition to health to our concerns with education and the child's functioning as a learner.

Incidents of severe malnutrition appear rarely in the United States today, but there is evidence to suggest that the low income segments of the population suffer from subtle, sub-clinical forms of malnutrition which may be partially responsible for the higher rates of morbidity and mortality of children in this group. Brock[52] suggests that "dietary sub-nutrition can be defined as any impairment of functional efficiency of body systems which can be corrected by better feeding." Since "constitution is determined in part by habitual diet... diet must be considered in discussing the aetiology of a large group of diseases of uncertain and multiple aetiology..." The relationship between nutrition and constitution is demonstrated by the fact that the populations of developed nations are taller and heavier than those of technically underdeveloped nations and that "within a given developed nation children from economically favoured areas are taller and heavier than children from economically underprivileged areas."

In comparison to the vast body of data available on the diets of peoples in tropical countries, very little research has been done in recent years on the nutritional status of various economic groups in the United States. The abundant American food supply may be the cause of the "unfortunate tendency in recent years for nutritionists and clinicians to dismiss the adverse effects of malnutrition on resistance to infection as unproved or unimportant... In the highly developed countries...the nutritional status of the population has improved to the point where malnutrition severe enough to influence the course of an infection is rare. Under these circumstances the short-term effects on nutritional status of acute infection are not of serious consequences."[53] The effects of long term sub-clinical malnutrition on the health of the individual, however, are not yet known and little research has been directed at this problem in the period since 1939. However, it is instructive to review the studies comparing the diets of low-income people with the rest of the population since these lay the basis for hypothesizing that nutritional differences may have some effect on the overall differences in health and learning ability between groups.

The nutritional differences between lower and higher income individuals begin before birth and continue thereafter. In a study of maternal and child health care in upper New York State, Walter Boek, et al.,[54] found that babies from low income families were breast fed less often and kept on only milk diets longer than upper income infants. Moreover, while 93 percent of the infants from higher class families received vitamin supplements, only 83 percent of those from lower income families were taking supplements at three months of age.

In a study of breast feeding in Boston, Salber and Feinleib[55] confirmed Boek's results and, "social class was found to be the most important variable affecting incidence of breast-feeding. Women who are married to students exhibit the highest incidence of breast-feeding (69.3%). Upper social class women breast-feed more frequently (39.8%) than women in lower social classes (13.6%) (Table 9)."

Social class differences in feeding patterns continue after weaning. Filer and Martinez[56] studied 4,642 six month old infants from a nationally representative sample and found that "infants of mothers with least formal education and in families with lowest incomes are fed more milk formula..." and less solid foods at six months old than those from higher educational and economic groups (Table 10). Class differences in the intake of most nutrients varied primarily according to the amount of milk formula consumed.

The researchers found that for "almost all nutrients studied, the mean intakes were well above recommended levels. The single exception was iron; more than half of infants do not get the lowest recommended provision -- a finding that corroborates the results reported by a number of other investigators." Iron deficiency was most prevalent among infants of mothers with low educational and income levels and infants whose mothers attained no more than a grade school education received a mean intake of only 6.7 mg. of iron a day, as compared to the 9.1 mg. mean intake of infants whose mothers had attended high school. Since "nutritional iron deficiency is widespread and most prevalent in infants in the low socio-economic group," and iron deficiency is the most common cause of anemia in infants during the first two years of life, malnutrition at least with respect to this nutrient is widely prevalent in lower class infants.

While this national survey found the diets of low income infants to be fairly adequate except for iron deficiency, a study of Negro, low-income infants in South Carolina[57] uncovered more extensive areas of malnutrition in this group. The researchers concern sprang from the fact that the death rate for Negro infants in South Carolina was twice as great as the national rate. Thirty-six Negro infants from low income families were tested when they visited a Well-Baby Clinic for routine examinations. The subjects ranged in age from four to ten months. "The body weights of 66 percent of the infants were below the 50th percentile in the Harvard growth charts, 34 percent below the 10th percentile and 9 percent below the 3rd percentile."

The investigators found that 29 percent of the subjects had "serum albumin concentrations which have been associated with marginal protein nutrition" and serum globulin concentrations below normal range. Sixty-one percent had total protein concentrations below normal and 33 percent had "serum ascorbic acid concentrations which have been associated with a sub-optimal intake of Vitamin C." In addition to these group indications of sub-clinical malnutrition, one infant's albumin concentration showed severe protein deficiency and "eight... infants had concentrations of serum ascorbic acid reflecting a severely limited dietary intake of Vitamin C." The researchers concluded that "it would appear possible that malnutrition may be one of the many underlying causes for the high rate of Negro infant mortality in South Carolina." Since Greenville County, where the study was conducted, has a relatively low number of infant deaths, "it is possible that malnutrition may be even more severe and/or prevalent in many other counties of the state."

Since the samples used in this study is quite small (36 infants), the results must be viewed as suggestive rather than conclusive. But taken together with Filer's findings on iron intake,[56] a New York study which shows that anemia is common among Negro and Puerto Rican infants,[58] and the recent finding that "some anemia was present in 59 percent of Glasgow slum children,"[59] the suggestion is strengthened that poor diet may be partly responsible for the poor health of lower socio-economic class children.

The studies so far reviewed have dealt with populations that are in some way representative of the nutritional status of large groups of children. Since these studies are few in number and limited in approach, they cannot give a complete picture of the nutritional status of lower class Americans. Hints about areas of malnutrition which have not been thoroughly investigated can be drawn from studies of special groups within the American population. In a survey of the "Dietary and Nutritional Problems of Crippled Children in Five Rural Counties of North Carolina," Bryan and Anderson[60] found that the diets of 73 percent of the 164 subject sample were less than adequate. The cause for the malnourishment of nine out of ten of the poorly fed children was poor family diet and in only one out of ten cases was the malnutrition related to the physical handicap of the child.

Although all the children were from families in the low income group, the researchers found certain significant differentiations between the Negro and white families studied. The interviewers recorded information about the daily food intake of the child, day-to-day variations in diet, weekly food shopping and the adequacy of home conditions for food storage and preparation. The child's diet was then translated into nutrient values and rated for degree of adequacy. On this basis seventy-one percent of the Negro children and 35 percent of the white children's diets were rated as probably or obviously inadequate. Only a limited number of food items were used and "in many of the families...only one food was cooked for a meal and this would be eaten with biscuits and water, tea or Kool-Aid... For the most part, the diets of our low income families contained few foods that are not soft or that require much chewing."

Suggestions of poor nutrition in infancy and childhood can also be drawn from studies of constitutional differences as well as from measurements of food intake. Einhorn[61] studied two New Jersey communities. School children were diagnosed as over or underweight by a physician rather than by height-weight tables. In the affluent community ("A") 3.8 percent of the children were found overweight and 1.2 percent underweight. Community "B", the non-affluent group, had a higher percentage of both under and overweight children, 9.7 percent and 9.6 percent respectively. While heredity and physical activity can of course influence the weights of children, it seems probable that social class differences in nutrition also played a role in producing the obtained differences.

A study of the nutritional status of junior high school children in Onondaga County, New York[62] compared subjects from broadly different economic groups. School "M" was 94 percent Negro, while Schools "L" and "J" were overwhelmingly white. The schools were also differentiated on the basis of the occupations of the students' fathers: "... of the 58 percent of the employed fathers from school M, 52 percent were laborers, whereas only 10 percent from school L and 38 percent from school J were in this category." When the heights and weights of the subjects were compared, a greater percentage of students from the lower-socio-economic class school fell in the short stature and low-weight zones. There was also a tendency for students from the predominantly Negro school to have less subcutaneous fat by ranking of skinfold than students from other schools.

When the subjects were asked whether or not they had eaten breakfast on the morning of the examination, 41 percent of the students from the lower economic group had not, while only 7 and 4 percent of the students from the other two schools had missed breakfast. There was also a slightly greater tendency for the white, higher income students to take supplements. Even those students in the lower class group who had eaten breakfast had a lower intake of calories, protein, iron, thiamine, riboflavin and ascorbic acid than subjects from the other schools.

Blood and urine samples were taken for all the subjects and the researchers set up criteria to determine the level of adequacy for the various nutrients. "Subjects from school M, (the Negro school) had a slightly lower average hematocrit, largely due to the greater number of female subjects from that school in the low classification (and) the average plasma ascorbic acid value for school M was about half as great as the average in school L." There was also a tendency for the Negro population to have low values for hexose and pentose when erythrocyte hemolysate transketolase activity was determined. The authors feel that further investigation is needed before any "implications of nutritional inadequacy can be drawn from this observation." Average urinary excretions of riboflavin and thiamine was above acceptable level in all groups, "but data for folinic acid indicated lower levels of excretion for children from school M than for children in schools L and J." The question whether this observation was related to the lower ascorbic acid levels of these children indicates a need for further study in this area. The authors conclude that the differences between the schools show a relationship between nutrition and socio-economic status. These differences are greater than the differences between male and female students, and are related to each other on the various parameters of the study. "There was a slight indication that the growth of the male subject in...school (M) had not been as great as that of the subjects in the other schools with whom they were compared. This fact was supported by somewhat lower average levels in the other parameters..."

Although the students at the predominantly Negro school in Onondaga

County did not appear to suffer from gross nutritional deficiencies, their diets were significantly less adequate than the subjects from the white, middle-class schools. The investigators did not attempt to link dietary habits with health records, but the results of the study lead to speculations about the relationship between suboptimal diet, rates of infection, school absence and academic performance.

The question of why, in a society with an abundant and often enriched food supply, several groups of the population are not adequately nourished has only begun to be answered. The answer appears to lie in two broad areas: money and information. Cultural differences in food habits and beliefs, though important, appear to lose their significance relatively quickly when adequate funds, higher general education, and sound knowledge of proper nutrition become available. Thus in an article on "The Nutritional Status of American Negroes," Jean Mayer[63] finds that "the food habits of Negroes belonging to the higher socio-economic classes appear to be essentially those of their white counterparts, (however) it can be fairly stated that in general the state of nutrition of Negroes is inferior to that of whites in the same geographic areas. In some cases, it is vastly inferior." Just as poverty and lack of education breed poor eating habits among lower economic class Negroes, low income combined with a good education can produce adequate nutrition, as has been shown in a comparison of the dietary habits of student wives with other low income groups.[64]

In a detailed study of the "Eating Patterns Among Migrant Families" in Palm Beach County, Florida, Delgado, et al.,[65] found that a combination of low income, lack of education, lack of kitchen equipment and proper storage facilities contributed to dramatically poor diets in the migrant families. Of the 35 families examined, the greatest number had 7 to 8 members living in one or two rooms with average weekly earnings from $36. to $43. "From $18. to $22. per week, about half their weekly earnings, was spent for food by the 18 families which had from 7 to 9 members each. According to Department of Agriculture standards, from $35. to $47. would be required to feed families of this size a low-cost adequate diet."

The diets of the families were surveyed on a 24 hour recall basis; serving spoons and plates were measured in order to estimate the amount of food per serving. When the family diets were analyzed in terms of the various nutrients, only 20 percent of the families met the National Research Council calorie requirements. Thiamine, protein, Vitamin A and iron requirements were not met by over 50 percent of the families. About 80 percent did not meet the requirements for calcium and riboflavin and 97 percent did not have enough Vitamin C. When the diets were analyzed in terms of food groups, it was found that none of the families met stated requirements for milk, green and yellow vegetables; only a few had citrus fruits and tomatoes, potatoes or other fruits and vegetables and eggs; and only 43 percent of the families met the daily requirements for meat.

Although physical examinations were not included in the study, "reports of examinations made in the health department clinics showed an apparent relationship between the dietary and medical findings. Families with lower intakes of necessary nutrients had diagnoses of rickets, marasmas, kwashiorkor, obesity, emaciation, nutritional anemia, and malnutrition, as compared with persons in the remainder of the group. Many of the children in families with lower intakes of nutrients were pale and underweight, and eight adults were markedly obese. Two women gave a history of miscarriages." A dental study of the study group showed "40 persons with dry and cracked lips, 14 with spongy gums, 27 with gums that bled easily, 21 with slight gingivitis, and 16 with signs of severe gingivitis." Most of the people had dental caries, and many had lost permanent teeth. These findings indicate a definite relationship between dental caries and problems of the gums and lips and a low intake of protective foods. These dental figures may be supplemented by the data presented in a recent government publication[66] which reports that in a national sample 63 percent of non-white children between 5 and 14 years of age have never been to a dentist.

Negro migrant agricultural workers have "the highest proportion of malnourished individuals of any group in the country," and Mayer[63] finds the "shortage of published data in this field striking." Although lack of money to buy nutritious foods is apparently the major reason for malnourishment, the lack of information about nutrition is also to blame for both the rural and urban Negro diet. A monotonous, limited diet is the rule for Southern rural Negroes and the inadequacy of the diet is exaggerated for Southern urban Negroes for whom the availability of green vegetables is decreased. "Consumption of fresh vegetables is low and consumption of citrus fruits negligible. Milk consumption is substantially lower than in white families... This is for a large part a reflection of lower income; but even at equal income, milk consumption may be lower for Negro families." Although calorie requirements are usually met in urban families, protein, calcium, thiamine, riboflavin, nicotinic acid, Vitamin A and Vitamin C requirements are often inadequately met.

In the North "even as approximate a description of the nutritional status of the Negro population is impossible to arrive at." Mayer observes, however, that familiar Southern foods of minimal nutritional value, such as turnip, mustard greens, kale, okra and plantains, are stocked by stores in northern Negro areas. "Careful perusal of the records available in large cities, as well as the collection of impressions of experienced physicians, dietitians, and health administrators, leaves little doubt that our Negro slums represent the greatest concentration of anemias, growth failures, dermatitis of doubtful origin, accidents of pregnancy and other signs associated with malnutrition."

Although the studies reviewed here are helpful for their indications and descriptions of areas of sub-optimal nutrition in this country, a detailed and comprehensive study of the nutrition of the low income population is still lacking. Since sub-optimal nutrition can have social and psychological ramifications, as well as constitutional and medical results, a more thorough knowledge of the ways in which nutrition can affect the daily life of the individual would be useful for all those who seek to improve the health and social well being of the poor.

SUMMARY AND CONCLUSIONS

This review has been brief. In it we have sought to examine certain selected conditions of health which may have consequences for education. Among these have been the conditions of obstetrical and perinatal risk affecting the child *in utero* and at birth, and the circumstances, particularly those relating to nutritional opportunities which may snigificantly affect his development and ability as a learner subsequent to being born. Clearly, such factors as acute and chronic illness, immunizations, dental care, the utilization of health services and a host of other phenomena, perhaps equally pertinent to those selected for consideration, have been dealt with either in passing or not at all. These factors have, however, been examined and in fact reflect the same picture that emerges from a consideration of the variables upon which we have focused attention. In brief, though much of the information is incomplete, though certain aspects of the data are sparse, a serious consideration of available health information leaves little or no doubt that children who are economically and socially disadvantaged and in an ethnic group exposed to discrimination, are exposed to massively excessive risks for maldevelopment.

Such risk may have at least two consequences for the functioning of the child as a learner. The first of these is direct and the second indirect. Conditions of ill health may directly affect the development of the nervous system and eventuate either in patterns of clinically definable malfunctioning in this system or in sub-clinical conditions. In either case the potentialities of the child as a learner cannot but be impaired. Such impairment, though it may in fact have reduced functional consequences under exceptionally optimal conditions for development and education, in any case represents a primary handicap which efforts at remediation may only partially correct.

The presence of excessive conditions of risk for nervous system dysfunction make it essential that in programs for remedial and supplemental education, careful consideration be given to the child as an organism and appropriate health, educational and remedial services provided. Given an excess in conditions of risk, socially disadvantaged children cannot be treated as a single homogeneous group but rather must be differentiated in accordance with the manner in which functions have been impaired by sub-optimal conditions both biologic and social to which the child has been exposed. At the level of research we need much more detailed information on the conditions of insult to which socially disadvantaged children are exposed. At the level of practice, we must institute the immediate application of available knowledge with the goal of optimizing conditions for physical and mental development.

The indirect effects of ill health or of conditions of sub-optimal health care on the learning processes may take many forms. Only two can be considered at this point. Children who are ill nourished are reduced in their responsiveness to the environment, distracted by their visceral state, and reduced in their ability to progress and endure in learning conditions. Consequently, given the same objective conditions for learning, the state of the organism modifies the effective environment and results in a reduction in the profit which a child may derive from exposure to opportunities for experience. Consequently, the provision of equal opportunities for learning in an objective sense is never met when only the school situation is made identical for advantaged and disadvantaged children. Though such a step is indeed necessary, proper and long overdue, a serious concern with the profitability of such improved objective opportunities for socially disadvantaged children demands a concern which goes beyond education and includes an intensive and directed consideration of the broader environment, the health and functional and physical well-being of the child.

Inadequacies in nutritional status as well as excessive amounts in intercurrent illness may interfere in indirect ways with the learning process. As Cravioto, DeLicardie and Birch[4] have put it, at least "three possible indirect effects are readily apparent:

(1) Loss of learning time. Since the child was less responsive to his environment when malnourished, at the very least he had less time in which to learn and had lost a certain number of months of experience. On the simplest basis, therefore, he would be expected to show some developmental lags.

(2) Interference with learning during critical periods of development. Learning is by no means simply a cumulative process. A considerable body of evidence exists which indicates that interference with the learning process at specific times during its course may result in disturbances in function that are both profound and of long term significance. Such disturbance is not merely a function of the length of time the organism is deprived of the opportunities for learning. Rather, what appears to be important is the correlation of the experiential opportunity with a given stage of development--

the so-called critical periods of learning. Critical periods in human learning have not been definitively established, but in looking at the consequences associated with malnutrition at different ages one can derive some potentially useful hypotheses. Relevant to the relation between time of life at which malnutrition develops and learning may be the earlier report of Cravioto and Robles[67] who have shown that as contrasted with older patients, infants under six months recovering from kwashiorkor did not recoup their mental age deficit during the recovery period. In older children, ranging from 15 to 41 months of age, too, the rate of recovery from the initial mental deficit varied in direct relation to chronological age at time of admission. Similarly, the findings of Barrera-Moncada[68] in children, and those of Keys, et al.,[69] in adults, indicate a strong association between persistence of later effects on mental performance and periods of onset and duration of malnutrition.

(3) Motivation and personality changes. It should be recognized that the mother's response to the infant is to a considerable degree a function of the child's own characteristics of reactivity. One of the first effects of malnutrition is a reduction in the child's responsiveness to stimulation and the emergence of various degrees of apathy. Apathetic behavior in its turn can function to reduce the value of the child as a stimulus and to diminish the adult's responsiveness to him. Thus, apathy can provoke apathy and so contribute to a cumulative pattern or reduced adult-child interaction. If this occurs it can have consequences for stimulation, for learning, for maturation, and for interpersonal relations, the end result being significant backwardness in performance on later more complex learning tasks."

However, independently of the path through which bio-social pathology interferes with educational progress, there is little doubt that ill health is a significant variable for defining differentiation in the learning potential of the child. In the course of our efforts to intervene effectively in the maximization of learning among disadvantaged children it would be disastrous if we were either to ignore or to relegate the physical condition and health status of the child with whose welfare we are concerned to a place of unimportance. To do so would be to divorce education from health; a divorce which can only have disorganizing consequences for the child. If we were to break the cycle which runs from poverty, ignorance to poverty, the conjoined links in this circle -- health and education -- must be simultaneously sundered.

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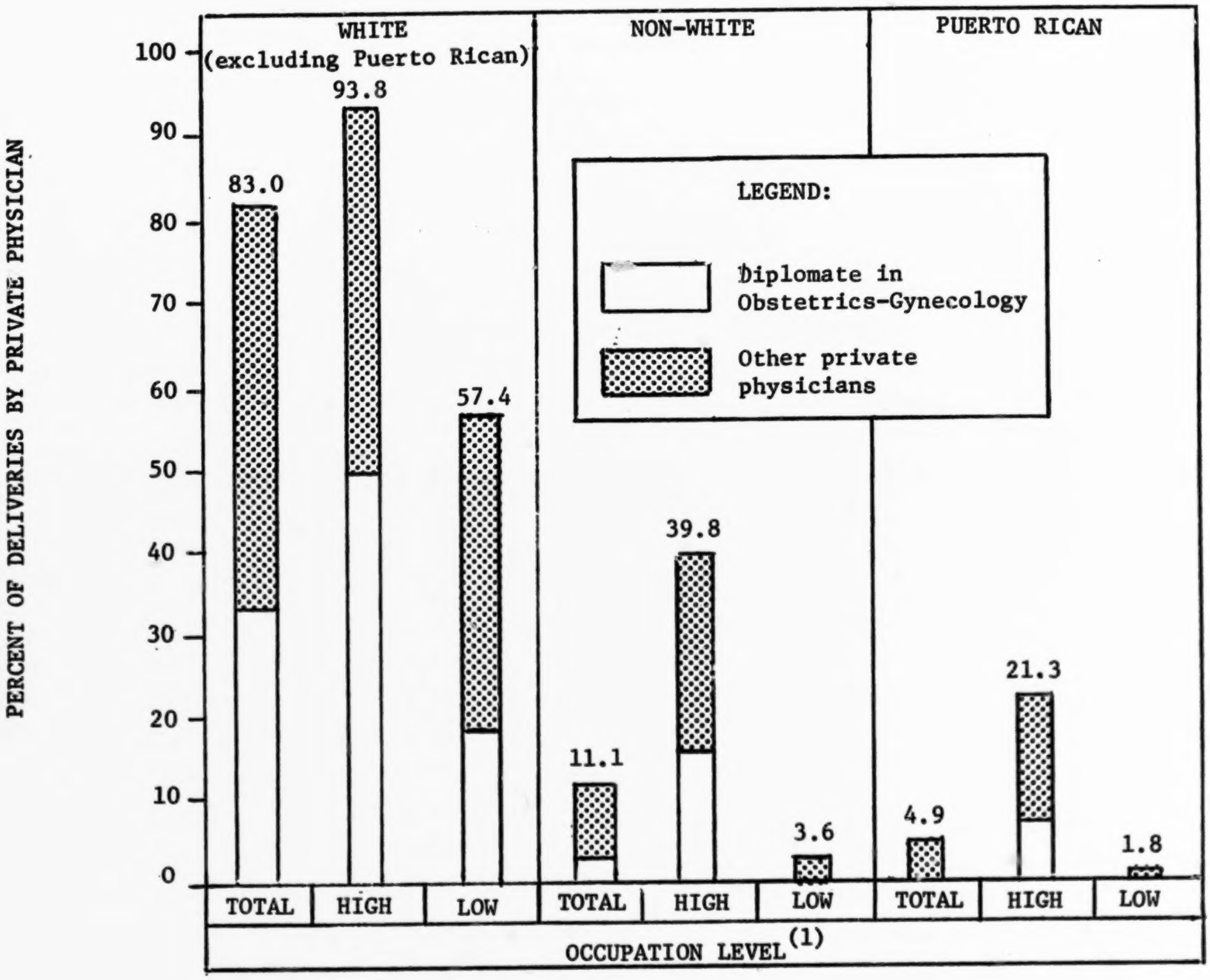
Figure 1

Percent of Single Live Births that Had Private Physician in Attendance by Level of Father's Occupation and Ethnic Group, New York City, 1955



Note: The complements of the percentages shown refer to deliveries in general service (ward), at home or in an ambulance; 96 percent of these cases are general service.

(1) "High" refers to "Professional, Managerial, Technical"; "low" refers to "Laborers and other."

From Shapiro, 1960

Table 1

PERCENTAGE DISTRIBUTION OF 4,254,784 LIVE-BIRTHS BY BIRTH WEIGHT AND ETHNIC GROUP, USA 1957

Birth weight (g)	Total	White	Non-white
1,000 or less	0.5	0.4	0.9
1,001-1,500	0.6	0.5	1.1
1,501-2,000	1.4	1.3	2.4
2,001-2,500	5.1	4.5	8.1
2,501-3,000	18.5	17.5	24.5
3,001-3,500	38.2	38.4	37.2
3,501-4,000	26.8	28.0	19.6
4,001-4,500	7.3	7.8	4.8
4,501-5,000	1.3	1.3	1.3
5,001 or more	0.2	0.2	0.2
Total	100	100	100
Percentage under 2,501 g	7.6	6.8	12.5
Median weight (g)	3,310	3,330	3,170
Number of Live Births	4,254,784	3,621,456	693,328

From Baumgartner, 1962

Table 2

SINGLE LIVE-BIRTHS BY DURATION OF GESTATION AND ETHNIC GROUP, NEW YORK CITY, 1958 AND 1959

Duration of gestation (weeks)	White		Non-white	
	Number	%	Number	%
36 or less	22,184	8.5	12,021	18.1
37 or more	235,013	89.7	52,285	78.7
Duration not reported	4,861	1.8	2,143	3.2
Total	262,058	100	66,449	100

From Baumgartner, 1962

Table 3

Incidence of prematures among single live births by race and socioeconomic class

	Socioeconomic class				Total
	White		Nonwhite		
	I	II	III	IV	
Total live births	12,035	10,091	3,940	3,495	29,561
Premature live births	603	879	526	513	2,521
Per cent premature	5.0	8.7	13.3	14.7	8.5

From Donnelly, 1964

Table 4

Incidence of obstetric abnormalities in Aberdeen primigravidae by maternal health and physique as assessed at the first antenatal examination. Twin pregnancies have been excluded.

	Health and Physique			
	Very good	Good	Fair	Poor; very poor
Prematurity* (%)	5.1	6.4	10.4	12.1
Caesarean section (%)	2.7	3.5	4.2	5.4
Perinatal deaths per 1000 births	26.9	29.2	44.8	62.8
No. of subjects	707	2088	1294	223
Percentage tall (5 ft 4 in. or more)	42	29	18	13
Percentage short (under 5 ft 1 in.)	10	20	30	48

* Birth weight of baby 2500 g or less.

From Thomson, 1961

Table 5

Prematurity Rates by Ethnic Group, New York City, and HIP (Adjusted) 1955-1957

Single Live Births Attended by Private Physician in Hospital

	Prematurity Rate per 100 Live Births[1]			
Ethnic Group	New York City[2]	HIP Adjusted[2]	Standard Error of Difference	P[3]
Total (Excluding Puerto Rican)	6.2	5.7	0.23	0.04
White	6.0	5.5	0.24	0.06
Nonwhite	10.8	8.3	0.74	<0.01

1. Prematurity rate is defined as the number of live births 2,500 gm or less per 100 live births.
2. New York City rates are observed rates for deliveries of women of all ages excluding those under 20 and age not stated.
   HIP rates are adjusted to age of mother and ethnic distribution of New York City deliveries (excluding deliveries to women under 20 and age not stated).
3. "P" represents the probability that NYC-HIP difference is due to chance factors.

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From Shapiro, 1960

Table 6

Perinatal Mortality Rates by Occupation of Father and Ethnic Group, New York City (Private Physician and General Service), and HIP, 1955

Single Births and Fetal Deaths

Rate per 1,000 Live Births and Fetal Deaths[1]

	New York City					
		Private Physician in Hospital				
Occupation	Total	Total	Diplomate in Ob.-Gyn.	Other	General Service[5] and Other	HIP
White (Excluding Puerto Rican)						
Total	29.6	27.1	25.5	28.1	43.2	20.1
Prof., Mgr., Tech.	28.3	27.6	26.9	28.2	40.0	14.1
Clerical, Sales	25.3	24.2	20.9	26.8	34.6	9.3[2]
Crafts., Oper., Serv.	29.5	26.9	25.3	27.7	40.6	24.8
Laborers, Other	41.9	34.0	34.4	33.7	54.2	25.2[3]
Nonwhite						
Total	59.8	49.3	48.6	49.6	61.2	28.1
Prof., Mgr., Tech.	53.9	43.9[3]	[4]	[4]	60.5	[4]
Clerical, Sales	40.2	50.0[3]			37.8	
Crafts., Oper., Serv.	45.0	31.9			46.9	
Laborers	86.6	136.5[3]			84.7	

1. Perinatal mortality rate is defined as infant deaths under seven days plus fetal deaths, 20 weeks gestation or more per 1,000 live births plus fetal deaths (20 weeks gestation or more). Rates exclude deliveries among women under 20 years of age.
2. Based on only five perinatal deaths and subject to large sampling variability (coefficient of variation close to 50 per cent).
3. Based on small number of perinatal deaths; coefficient of variation is about a third.
4. Not shown; majority of rates in these columns based on very small numbers of perinatal deaths.
5. General service (ward) cases represent about 96 per cent of the births in this category. The remainder are primarily deliveries at home or in an ambulance.

From Shapiro, 1960

Table 7

Effect of Bacteriuria During Pregnancy on Occurrence of Pyelonephritis, Prematurity, and Perinatal Death

Patient Group	No. of Patients	No. with Pyelonephritis	Premature Infants (per cent)	Perinatal Mortality (per cent)
Untreated bacteriuric	48	20	24	14
Treated bacteriuric	43	0	10	0
Non bacteriuric	1000	0	9	2

From Kass, 1960

Table 8

Occurrence of Bacteriuria in Various Population Groups Surveyed at Boston City Hospital

6% of 335 females in medical outpatient department

4% of 102 males in medical outpatient department

18% of 54 diabetic females in outpatient department

5% of 37 diabetic males in outpatient department

6% of 4000 pregnant females making their first prenatal visit

98% of 100 patients with indwelling catheters for 96 hours

2% of 350 patients, previously without bacteriuria, who underwent single catheterization

30% of 76 female patients on medical wards

12% of 82 male patients on medical wards

70% of 13 male patients on genitourinary ward

From Kass, 1960

Table 8a

	WHITE		PUERTO RICAN		NON-WHITE	
	married	unmarried	married	unmarried	married	unmarried
Private services	85.8	17.3				
Ward services	12.2	81.0	90.4	97.5	82.1	97.4
Prenatal care in first six months	87.2	36.7	60.4	43.5	61.7	42.9

Drawn from Pakter, 1961

Table 9

Incidence and Duration of Breast-Feeding Among 2,233 Mothers

	SOCIAL CLASS OF FATHER		
	Students	Class 1 & 2 (Warner's)	Class 3 - 7 (Warner's)
Total Number	88	550	1595
Number Breast-Feeding	61	219	217
Percentage Breast-Feeding	69.3	39.8	13.6
P For Difference in Proportion	$<.01$	$<.01$	$<.01$
Mean Duration (Days)	123.0	111.7	98.5
P For Difference in Means	$>.05$	$>.05$	$>.05$

Data drawn from Salber and Feinleib, 1966

Table 10

Table 3. Single-Day Mean Caloric Intake of Six-Month-Old Infants

	Total Calories			Percentage Distribution of Calories							
Sample	N*	Mean ±	S.D.	Milk	Fruit	Cereal	Veg.	Meat	Egg	Fruit Juice	Other
Total U.S.	4,146	822	248	67	11	4	4	4	4	4	2
Male	2,080	846	253	66	11	4	4	5	4	4	2
Female	2,017	798	241	68	11	4	4	4	4	4	2
Primiparous	1,047	805	232	64	11	4	4	5	4	5	2
Multiparous	2,948	829	252	68	11	4	4	4	4	4	2
Urban	2,731	831	248	65	12	4	4	5	4	4	2
Rural	1,416	803	249	70	10	3	3	4	3	4	2
Pediatrician care	1,755	812	239	65	12	4	4	5	4	4	2
General practitioner care	2,233	828	250	69	10	4	4	4	3	4	2
Education of mother											
Grade school	294	808	315	72	8	3	3	3	5	5	1
High school	2,726	836	253	67	11	4	4	4	4	4	2
Post high school	1,088	793	207	65	12	4	4	5	4	4	3
Annual family income											
Less than $4,000	894	844	304	69	9	3	3	4	4	5	2
$4,000-$7,000	1,948	823	233	67	11	4	4	4	4	4	2
More than $7,000	1,135	803	217	65	12	4	4	5	4	4	3

* N = Number of infants. Although the total number used in the survey = 4,146, N values vary since some mothers failed to indicate sex of infant, parity, family income, etc.

Filer and Martinez, 1964

E

DISCUSSION

Following the Birch Report

Dr. Wortis: I'm somewhat apprehensive about the presentation by Dr. Birch. It's met with such general approval that we may well lose some necessary sense of proportion. In this area of health, emphasis is, perhaps, even more important than the specific facts which we present. Now, it's this matter of emphasis that I'd like to examine. I think biological factors, when broadly regarded, are extremely relevant to the problem of learning in general and to the problem of the learning of the disadvantaged in particular. But I don't think they are of greater relevance than other factors. Let me explain. There are, for example, some children who fall so far behind in their intellectual development that they test a few deviations from the mean on the conventional I.Q. scales. Now, we simply don't know which proportion of these so-called retarded children are biologically defective and which proportion are socially or psychologically deprived. Isn't it reasonable to surmise that a sizable number of the children who are classified "retarded" may have no biological defects? And of those who have known or presumed biological defects, doesn't a certain percentage show degrees of diseases, which in their totality add up, perhaps, to no more than fifteen percent? Moreover, there are a certain number who have defects related to accidents of birth or growth; they make up another fixed percentage. Thus, we are left with a substantial number of the total retarded group who have fallen behind for causes unknown. And of these unknown causes, a very large percentage has effects which fall in the mild to borderline range. Now, on the normal distribution curve, the borderline cases outnumber the severely retarded approximately twenty to one. Observing this proportion, Penrose and others haven't been able to find a close correlation between mild to borderline retardates and social class. Likewise, they haven't detected a close correlation between social class and the severely retarded. One reason, of course, is that the severely retarded are numerically small to begin with, and in relation to the total number of retarded children, those children whose retardation can be linked with social class amount to an even smaller number. I want to be emphatic about this, because even though one acknowledges the importance of biologic factors, I think that we ought to retain a sense of proportion and recognize that these factors do not loom very large in the whole problem of retardation. Also, I think it's important to keep a sense of proportion, because even when considered from a public health point of view, a very large number of our mildly retarded children have nothing significantly wrong with them in a physiological sense; instead, they are impaired in terms of social biology. In saying this, I'm well aware of the danger that teachers with certain sophisticated ideas would listen to me and be quick to make biological malfunctions the sole cause of the poor showing of low income children. I for one don't want to encourage that kind of thinking at this stage of the game, even though the biologic factors play a role.

Dr. Robinson: It seems to me, Dr. Wortis, that you've been observing how retarded and disadvantaged children with severe biological defects add up to a small number. From this observation you infer that there's no significant correlation between retardation and social class. However, you can't expect us to go on and conclude that, since biological factors have been eliminated in terms of their statistical significance, the social and psychological factors are to be taken as the predominant ones.

Dr. Wortis: In a sense you're right; but permit me to round out my remarks. Again, I say that biologic factors play a role. Nevertheless, I'm suggesting that every evidence of neurological damage is significant. In fact, I have the impression, which I can't validate right now, that many of the biologic defects are reversible: Poor hygienic conditions,fatigue and some marginal or sub-optimal nutritional states blend themselves into the kind of conditions which can be treated. Thus, even where non-psychological or non-social factors enter the picture, the scene is not always one of a definitively irreparable disease. When I was in the Soviet Union, I noticed that a certain class of their retarded children had gone through "diagnosis of the authentic type," a term by the way which I'd never come across 'til then. This term signified the kind of diagnosis which had to do with children, without biologic defects, who lived under poor conditions, tired easily and couldn't apply themselves to tasks which required endurance. For the treatment of these youngsters the Russians set up special so-called "forest schools" or schools in open air settings. Their goal has been to supply each child with as vigorous and nourishing an environment as each requires to overcome the effects of poverty. We, in the United States, might gain a lot by applying these concepts to our own special problem of retardation.

Dr. Birch: There are a whole series of issues which come out of what you said. In the first place, I think one should distinguish very carefully between mental subnormality and disturbances which lie at the starting point in a continuum of learning capacities. One cannot generalize from the specifics of our data on mental subnormality to such a continuum. In Britain, for example, 50 percent of the children from the lower class who show I.Q.s of 60 and 70 are children in whom there are clear signs of neurological disorders. Moreover, the frequency of below average birth weight is several times higher in the mentally subnormal children of this class than in the same kind of children from the higher classes. Both of these factors point to a powerful pattern of insult against the lower class. If this is true in Britain, where homogeneity of ethnic groups is several times higher than that of groups in the United States, we're probably correct in supposing the pattern of insult is much more forceful in our country; here social disadvantage is not only associated with the medical care system, which in Britain--to mention the contrary--applies equally to the duchess and her cook; but it's also linked in our country with race. But, when it comes to relating this dimension, in which a child's position on the continuum of learning is determined at any given moment, to the problem of mental subnormality, I think we run into certain difficulties. For one thing, subnormality entails a set of factors which differ quite remarkably from those factors which determine whether a child has been insulted enough to become temporarily or even permanently disabled for learning. In contrast, of the four or five influences which may contribute to mental subnormality, the least important perhaps is that which is linked with insult. So, despite the influence of social class, we must look to the other ways in which poor health conditions, absence of sufficient stimuli at home to learning, and so on, can arrest the child's development. Furthermore, whenever one tries to separate the biologic from the social, one falls into a snare of delusion. None of these health influences are isolated from the social context in which they occur. They are, in fact, of a bio-social nature, with biologic impairment going hand in hand with absence of any opportunity for social improvement. The issue, therefore, should never be one of counterposing biologic against social processes, even though there are many teachers and scientists who want to do so in course of developing facile answers to very complex problems.

Dr. Pasamanick: What our difficulties have been, I think, is that, having started somewhere in the middle of the process, we find ourselves in trouble. From the start, it was clearly obvious that we had to proceed in a longitudinal manner so as to come up at last with criteria upon which we might base our decisions. But, along the way we've discovered certain unforeseen obstacles. For example, the diagnosis of mental impairment in an infant is a relatively simple operation; but this simplicity vanishes when you come to diagnosing a school-age child for some undetermined impairment. It's this apparent discontinuity which makes the going rough for the neurologist in his diagnoses. Out of all this one thing has become clear: a single index of mental impairment is no good at all. We should have a network of indices for adequate diagnoses. So the longitudinal approach turns out to be nothing more than the customary historical procedure in medicine of going back and forth and correcting, say, the errors of infant diagnosis on the basis of school age diagnosis, and then using the less error-bound infant diagnosis as a basis for correcting future diagnosis of other school age children. As you no doubt know, this medical procedure usually takes decades, even centuries in some cases. Clearly, then, the rate of self-correction and approximation is somehow related to our quickness in handling the data which has been accumulated so far; and more especially, it's related to our adeptness in following through on cases, samples and whole populations with the techniques that are now available.

Dr. Wortis: We have heard a well documented account from Dr. Birch of the importance of biological factors among the socially disadvantaged. Now, I think we all agree, first, that the disadvantaged are completely exposed to the injurious effects of these factors. I think we all agree, moreover, that an improvement in medical care would help alleviate some of these problems. But I also feel that we have to come up with some working hypothesis which will allow us to envisage the scope of the overall problem. We simply cannot wait for research to give us the needed answers. With the problems of the disadvantaged in their daily experience of deprivation, and of the schools in their inability to meet the needs of these children, and, lastly, of medical and psychological research in its slowness at developing and arranging in proper sequence the devices which can pinpoint and remove somewhat the handicaps of the disadvantaged, we must acknowledge as first and foremost the necessity of some overall hypothesis on which to base all our work. Without this kind of hypothesis we cannot ever hope to measure the relative importance of the biologic as compared to the psycho-social factors which are at work. As for my part in working toward such a hypothesis, my efforts have been directed by and large to assessing the relative significance of separate ingredients, each of which, in having its due weight assigned, could put us in a better position to know which problems are of primary concern and which are secondary. Right now the absence of an overall hypothesis leaves us in the dark as to knowing how to designate specifically which child's handicap reflects the product of biological disorders and which child's handicaps stem from psycho-social deprivation. But, I'm happy to say that, after sixteen years of involvement on a daily basis with disadvantaged children and their problems, I've come pretty close to a working hypothesis. My tentative hypothesis comes out of such observations as these: First, in the distribution of scores on I.Q. exams, those ranging from zero to 55 probably show the level of mental growth of practically all children with some significant biologic defect. I imagine, 99 percent would be an understatement. At the same time, we should observe that these are the scores of a relatively small proportion of the total retardate population. When we move along the distribution of scores to the 55 to 70 range, the percentage of biologically defective children may be no more than 60 percent. Now it's important to keep in mind this sharp reduction. For, when you move to the range of borderline retardates, roughly 70 to 80, I surmise without evidence that the percentage of biologically defective children may be as little as 15 percent; and, further, that when you pass into the lower bound of the normal IQ range which is made up of poor learners, most of whom make up the largest number of disadvantaged children, the percentage of children with biologic defects may be as little as five percent. Second, even of those biologically defective children a good percentage have disorders which are reversible: poor housing conditions, nutritional deficits and poor health habits are directly associated with these disorders. And from the medical and social point of view, they are conditions which can be treated very easily so the children can enter the normal process of learning. And third, a certain proportion of retarded children can be regarded as normal biological variants. For, let us never forget that whatever we call innate intelligence is not uniform throughout the human species, but is subject to a certain amount of variation. From these three observations I have arrived at the following ground rule: Since it's very difficult to distinguish the child whose innate capacities are limited on account of normal biological variations from the child whose capacities have been dampened by some deficiency in its home environment, the aim of all current research should be to discover the parameters which would help us in drawing such a distinction. Let me explain: The nervous system of human organisms can be construed into different levels of operation and complexity. At the lowest level the rather crude reflexes operate, the swallowing reflexes, the lid winking reflexes and the like. Perhaps, these lower operations tell us something about the goings on at the highest levels; but, more than likely, because of the complexity of these latter operations, there's no sure way of arriving at a one to one correspondence between, say, a crude lid winking process and some aspect of the learning process. At the highest level in which cognitive patterns are shaped, the operations become so complex in their physiologic make-up as to go beyond even the internal workings of the organism, becoming implicated in some undefined way with its world of experience. For us in research, all this means that, in the intermediate range of organic functions, that is, at levels of operation which are above those of the gross reflexes but fall below the levels at which concepts and cognitive patterns are shaped, we must concentrate all our work and aspire to discover the nature and sequence of the verbal operations which occur. For, with an adequate index of these operations, we may hope to distinguish more precisely between those children who, because of normal variations in intelligence, simply don't have what it takes and those children who haven't had a chance to show what they've got.

Dr. Birch: From Dr. Wortis' observations some very important questions have been generated: One has to do with determining the conditions which expose children to potential sources of physiologic disorder; another carries us into the equally difficult business of learning how to distinguish the patterns of mental disturbance into their different levels; and a third question challenges us men of the medical and academic community to define in clear-cut and honest terms the possible ways for removing at once the conditions of poverty. To begin with, I feel no need whatsoever to repeat percentage figures which have been grounded experimentally; nor do I feel compelled to distinguish those figures from others which have been presented as untested conjectures. It suffices to observe that we don't start from a worm's eye view of condition X and go into tedious dissections of the parameters of mental subnormality in child A, child B, and so on to infinity. We start, rather, with whole populations of children and trace whatever common condition has led them to lag behind the rest in the learning process. To be quite frank, however, research really isn't needed for the clear and certain knowledge that we must formulate a policy and join to the practice very soon of providing at least the minimum requirements for a healthy childhood environment. Second, to post health conditions as alternatives to the social nature of human experience makes absolutely no sense to me; and I'm certain, such an artifice should make no sense to anyone else. What we go through and call experience is dependent not only on what the social surrounding makes available, but also on the way we as the human element of the total surrounding respond to the other givens. The child who's been so underfed as to have massive physiological disorders is bound by an almost implacable physical necessity to show a reduced capacity for developing his intelligence through objective, social means. Again, I repeat, problems of research present no obstacles to determining how this condition can be altered. The real obstacle is money; and I'll have more to say about that in a moment. But as for problems of research, I myself have devoted half my life to arriving at a sound method of differential diagnosis, and always my goal has been the correlating of certain cerebral processes to the ostensible forms of learning. For example, in our own work, Bittement and I came to the same conclusion about the primary function of the cortex as did Pavlov, Sherrington and others. The cortex is, namely, the place where three kinds of sensory processes come together: one process of distinguishing and analyzing impulses within certain projective systems; a second process of interlacing the differentiated elements of one system with those of others through the growth of certain organic bonds; and a third process whereby some of the interlaced systems are translated out of the cortex into certain actions of the whole organism--, all three of these processes probably take place in the cortex. Now, as for correlating disturbances of the cerebral process to outer circumstances as shown in the signs of mental retardation in children, we have very good reasons for believing the variables of childhood experience will be shown to have diagnosable correlatives to variations in the rate and degree of sensory integration in the cortex. However, because of certain biased features in the way we designate norms of intelligence, we are somewhat at a standstill presently in coming up with a relatively error-free correlation. In terms of function, the central nervous system is, quite simply, the differentiating and integrating organ of bio-social stimuli. More succinctly stated, all three cerebral processes amount to one continuous processing of our outer environment. For this reason, in looking for brain damage in children who have been exposed to an unhealthy surrounding, we are quite clear as to the correlation between occurences of mental retardation and an extensive history of social impoverishment. But, when it comes to showing the significance of this correlation to measurements of the child's place along a continuum of learning processes, we run into the fact that most of our indices of intelligence are so culture-bound as either to leave mental performances which go on outside the bounds undetected or, what is worse, to penalize such performances as pointing to signs of mental subnormality. For example, I became very upset when trying to measure as simple-seeming a physiological phenomenon as auditory recognition time in Negro people from the working class. Usually the experiments are carried out on college graduate students or on white professionals. For these latter two groups it's been established that, upon hearing two sounds, with one separated from the other by an interval of one or three seconds and with the second being louder than the first, most of the subjects either underestimate the intensity of the second stimulus or judge both to be identical. But, after successive trials in which the same sounds are generated and received at the same rate, the same subjects approach and eventually arrive at a correct estimate. However, when the same experiment's conducted with Negro men and women from the working class, there's a marked divergence in their estimates from trial to trial, with, moreover, delay time in their response increasing up to five seconds as the trials near the end. Now, these are men and women who had no clinically known history of damage to their central nervous systems; yet, unlike the other two groups, the Negro group failed as a whole to show the norm-response pattern in which a repetition of signals supposedly helps and not distracts a subject in arriving at a correct estimate. I really don't care at this point about the remote causes for this puzzling phenomenon. What's got me worried is the thought that the same kind of thing's been happening in classrooms all the time. In this situation, repeated stimuli to learning are designed to draw the same physiologic response from all class members, regardless of ethnic origin or social class. But, if the experiments of mine have any validity, the presumed sameness of response must now be looked on as fragmenting into different patterns. For one socio-ethnic group the pattern of stimuli do their expected job of facilitating certain learning processes; but for another group the same pattern is, for some reason, never permitted to extend so far into the cerebral complex as to induce the shaping of sensory impulses into cognitive patterns. Instead, a continuous alteration of their responsiveness to, say, the threshold of auditory experience disturbs the integrating function of the cortex in such a way that the whole developing organisms are inhibited to the primary experiences of intuiting and distinguishing. And the absence of cognitive patterns from prior experiences keep them from entering the more complex processes of interlacing and retranslating. Again, I repeat, I'm really not interested in remote etiologies. My concern is with the setting up of programs to remove the present conditions which are attending those disturbances. This concern makes me point to that obstacle which I touched on before, namely: money and the specious problems it raises for sound educational and social policies. Debate as to the cost of such policies or to ways of saving money at the expense of a child's development is something which I for one refuse to participate in. I simply refuse to mask indifference to the plight of disadvantaged children behind dirt-cheap modifications of educational tactics. I will have nothing to do with concealing from myself a matter of conscience, namely: the sheer ugliness and oppressiveness of the condition which has hindered children of Negro communities from growing up naturally. If we are genuinely concerned with fostering the development of these children, we should become at least as progressive as John Galbraith who contends, as you recall, that after certain societies have developed themselves in an unwise technologic manner, discovering their economy at the point of collapse into widespread poverty, the governments of such societies attempt to avert the inevitable by breaking off small fragments of an already depleted wealth and allocating them to isolated sectors of their exhausted economy. According to Galbraith's theory, the meagerness of their allocations has been dictated by an economic necessity; they simply don't have the resources to provide more. But in the affluent society, he maintains, no such necessity exists. Governments of such societies have no valid reason to pinch off fragments of the total wealth. To Galbraith we are an example of the affluent society which has the wealth and the technology to draw on for the removing of each and every instance of economic poverty. As men of the medical profession we have,then, the obligation to steer away from phony research projects and to get into such real ones as will remove the identified conditions for ill-health in children. Of course this does not mean that men of the academic community will be left with nothing to worry about: a well-fed healthy child who's been shut inside a closet for most of its life will not have the developed brain of a physicist; and it's even less likely that a child who has not been taught the ABC's of reading and writing will become a literary genius overnight simply because it's been well-clothed and well-housed. All I mean is posed in this question: do we invest more energy on research for the expansion of the clear and obvious or do we turn on the basis of our accumulated knowledge to the implementing of sound social practices?

Dr. Richmond: Historically, many of the categories for the diagnosing of neurologic disturbances have withstood the test of time, serving us fairly well until only recently. Today the same categories fall short of giving us adequate knowledge of conditions whose variables operate at different levels and whose effects are exhibited in the problems of disadvantaged children. Now my plea is directed to us coming up with a more dynamic view of diagnosis. For, I think we've just about exhausted past nosologies in terms of their efficiency.

Dr. Knobloch: I have a feeling we're getting away from the major issues that were raised by Dr. Birch's reply to Dr. Wortis' statement. Following up one of those issues, I think we as investigative scientists of sorts should ask ourselves: can a program of intervention be recommended by us? In looking to this question, I'm certain we really have to do much reflection on the things which educators and others are asking us to recommend.

Dr. Birch: I think Dr. Knobloch's question can be raised to a more general level. At a recent symposium on racial differences, Dobzhansky asked a similar question. Doby's reply, in terms of genetic traits and the identification of them, was perhaps the clearest. Doby maintained that any accurate account of genetically-defined differences presupposes the existence of an objective surrounding which is equally good for all individuals who live in it. At least from the standpoint of genetic differentiation, then, gross inequalities in the environment of families of men have to be removed before the genuinely genetic traits can be identified. Now I believe we can extend this same fact to any kind of diagnosis. Clearly, we as physicians must recommend that, before turning to us for assistance in diagnosis, educators and others must do more to equalize the surroundings.

Dr. Helen Wortis: I hesitate in pointing to a somewhat obvious fact: As doctors and educators none of us probably needs to be reminded that we are working within an extremely limited part of the total environment of children. We see them no more than five hours out of the total twenty four, and this means the major part of their learning experience goes on outside the controlled environment of classrooms. To overcome these limitations, therefore, we have to plan in a really global way. Comprehensive approaches to public health should be the primary task of our research and work. On the other hand, the classroom dimension should become more subordinate. We should stop venturing into projects which amount to nothing more than a fragmentation of the comprehensive approach and look, instead, more globally into such interrelated concepts as that of bringing entire families into special health and education programs, rather than isolated individuals; or into other related concepts such as those pertaining to child day care lasting from ten to twelve hours and the concepts having to do with serving meals in public schools. The three and four hour programs like Head Start must be made more extensive or thrown out altogether. In short, I think much more thought has to go into concepts of regional planning. These concepts, I'm sure, when thoroughly looked into, will provide us with goals which pertain to whole geographic areas, to total populations, and not simply to particular city blocks or isolated families.

Dr. Gordon: May I address a two-part question to you and Dr. Birch? We have thought of public schools as the place for maintaining the tradition of equalization of opportunity in our society. Now, as we focus on the goals of equality, we have to recognize that they may not be achieved readily in our society. So, in the absence of the immediate achievement of these goals, should we expect schools to turn about and put forth some extra efforts by serving as a kind of equalizer? The second part of my question has to do with the experience of workers in Scandinavian countries. Supposedly they've tried to equalize medical care and basic welfare provisions. Does anybody know how far they've gone in reducing the problems of children who adjust poorly to school or who underachieve?

Dr. Helen Wortis: As for the second part of your question, I know that in Scandinavian countries they are abandoning their breakfast-lunch programs. Apparently, they've reached such a level of adequate nutrition that they simply don't need the programs any more. Now, in our criticism of what schools in the United States are failing to do, I think we are expecting too much from the schools in their present orientation. Public schools were devised as a supplement and not as a substitute for parental education. The families themselves were looked on as the mainstay for child upbringing. Well, we have quite a different kind of society now. For example, the whole institution of marriage has undergone significant changes: one parent families, usually with the woman as the head, are occuring more and more frequently. To put upon public schools the burden of substituting for deficits in the family life is something which schools are unprepared for. So, I think, we have to look on our present problem as more than an educational one. The more fundamental problem is with ourselves as a nation in the process of such drastic changes that we have to come across with new and different approaches to all aspects of society, including those of education. In this context, schools can only do their part but no more.

Dr. Birch: To a certain extent, it's entirely appropriate to expect more from schools with respect to the nature, the quality and the fitness of current educational practices. And insofar as this expectation carries with it the assumption that education is responsible for the development of literacy in all and for academic competency in many, there's no question in my mind that in this country and in many others, schools have not served even their avowed function. In fact, there's been a strong tendency in most schools to excuse their failure by pointing to the unresponsiveness of certain children to the tried and true curriculum. There's been no serious effort to arrive at clear and unbiased answers to such questions as what are the appropriate conditions for optimal learning in this or that child who comes from this or that background of prior experience. Instead, there's been a continued push to adopt the method which is appropriate for the acquisition of learning by children from the middle class and to call other children who don't do as well, those who have failed to learn. So far as I know, no school has confessed that these other children are the ones whom they've failed to teach. So, Dr. Gordon, I think the answer to the first part of your question is clearly evident in this important fact: wherever and whenever a child has failed to learn, it's not the only one who has failed. The school system itself is a failure in not having developed appropriate methods for the education of all children.

Dr. Gordon: With that answer to my question, I'd like to ask you another: Are there any problems which so completely interrelate biologic and social factors as to require that bio-social scientists work together with educators and physicians toward common solutions?

Dr. Birch: Yes, there are many of these. To take one example: Dr. Meyers mentioned to me the other day, that, when he was on a consultation trip through Georgia, someone asked him whether for a school population of 25,000 there should be two or three nurses in the school's health program. From this example alone we can see that, given the kind of population of children along with the kind of organization of the school itself, there's apparently a gross lack of awareness on the part of at least one of its educators to the interrelatedness of health problems and obstacles to learning. If most educators were fully aware of this interrelation, they would insist, for one thing, that all the children in their schools have an adequate diet, doing so perhaps by using the Scandinavian model. Pressure has to come from the educators, and, to be sure, in conjunction with discussions and planning sessions with health organizations equipped to treat such massive problems. Consultation with one isolated physician just won't do. For another thing, educators must take more seriously the problem of absenteeism in schools. After all, absenteeism is an aspect of some major social disturbance with many other different aspects; it's not a random phenomenon but appears most prevalently within that group of disadvantaged children we are concerned about. As a project for the social scientist, a thorough inquiry should be undertaken into the causes of absenteeism and into the necessary measures for remedying it. There are other examples of this kind which can be enumerated: general health care, remedial learning, and so on. However, the one thing that must be avoided is the shifting of the responsibility for educational diagnosis onto that which pertains to medical diagnosis. Let me explain. There are many schools which are trying to establish special curricula on the basis of what are essentially noneducational categories like those for describing neurologic impairment. On this medical basis, educators are deciding into which class the child should go. As physicians we know, however, that effects of brain damage cannot be reduced to simple all-or-none categories but vary from no discernible effects at all to the extremely massive ones. So, counter to the current trend which makes intricate problems of medical diagnosis into simple answers for educators, I contend we can't substitute the medical for the educational.

Dr. Gordon: If someone asked you: Do biologic treatments of certain dysfunctions of the nervous system have any consequences for the learning processes of disadvantaged children; how would you reply?

Dr. Birch: In a broad sense, I would say no to that; in specific instances, yes.

Dr. Gordon: Now I want to know whether it would be helpful for a sophisticated teacher to have a pediatrician in the classroom sitting at her elbow and talking to her about the relationship between the biologic characteristics of cortical function in a certain youngster and manifest disturbances in its learning process. In other words, would anything come of the interaction between the pediatrician and the teacher so that the latter, with her newly acquired sophistication in approaching the process of teaching could understand the biological factors behind the youngster's poor showing and then somehow straighten out the learning process for this child?

Dr. Birch: If you want to know what I think, I'd say that pediatrician would have a great deal to learn.

Dr. Wortis: I'd say the same. As for an answer to the other side of your question, I think it's not because conventional medicine is confined to categories and diagnoses which have far too little relevance to the functional states which make up the concrete learning process. On the other hand, observant teachers are in an excellent position to teach us a great deal about those very same functional states, including observations of their own problems in teaching. I believe we're neglecting a very valuable source of knowledge by not implicating more of the good and experienced teachers in our discussions. Unsophisticated and empirical as their experience may be, these are the teachers with the best know-how going. For analogy's sake, I'm reminded that Wagner-Jauregg was the first psychiatrist to receive the Nobel prize for useful psychiatric treatment. In Vienna he quite openly confessed that he learned about the useful influences of fever on chronic mental illness by listening to the nurses who had lived with the patients for years and who had learned about the effects of febrile illness on these patients. To him, he said, it was a pot of gold in the middle of the road that no one had picked up til he came along. Through analogy I'm sure there are similar resources of information among teachers. We need to use them.

Dr. Gordon: Am I then correct in supposing that any investment of research money into problems related to the interaction of biologic functions with the teaching-learning process would be an inappropriate use of the money?

Dr. Birch: No.

Dr. Wortis: Let me point to one area where I think such an investment would be very useful. In the pediatric and psychiatric services, we are working on slow-developing infants. To me this work seems an ideal place to start correlations between the findings of pediatricians acquainted with processes of early child development and the observations of teachers and diagnoses of psychiatrists. I'd like to see the day come when infant patient services for autistic and slow-developing babies is closely coordinated with the work that goes on in nurseries and psychiatric departments.

Dr. Richmond: To define another area, it seems to me that one has to inquire more deeply into the child rearing patterns which occur within families from different ethnic backgrounds. I think we should really look to individual families and see how one or both parents transform an otherwise purely bio-physical surrounding into a psycho-social condition for the whole subsequent development of infants.

Dr. Wortis: A key word in this complex of considerations might be the word "plasticity." From an educational standpoint at least, change is the thing we're interested in. So, in all discussions about diagnostic categories, we have to formulate those diagnoses which have a meaningful relationship to promoting changes in the learning process of certain children. Our primary interest should not be in etiology or anything of the kind, but in coming up with a method for distinguishing those children with a limited capacity for change from those without any significant capacity. And I'm sure that what we will discover are organic capacities for change or plasticities of the organism which operate at many different levels, some of them on account of their rigidity, corresponding to terminal states, others of them, for one reason or another, having to do with some degree of plasticity; while still others, because they implicate bio-social variables, point out to disturbances of a completely reversible kind. From such an investigation we may arrive at the conclusion, for example, that the child who's been exposed to a certain kind of psychological experience for a certain number of years cannot be changed or have his disturbance reversed at all. And this may hold true even though the child lacks plasticity for some purely social reason.

Dr. Pasamanick: In terms of programs and their relevance to functioning or dysfunctioning individuals, I think we already have fairly reliable models to use. It seems rather superfluous to me, then, outside of propaganda motives, to point to the need for more models. Under present circumstances, what really has to be done is in the region where programs of intervention are conducted with a kind of self-corrective understanding of which bio-social variables distinguish the efficacious approach from its opposite. Now, I think the real tragedy is that we have come together here to talk about research which will demonstrate to people that good health and good education produce good people.

Dr. Deutsch: So far in the discussion I've been accumulating a lot of key points. If you'll permit me to go back and forth a little, I'd like to pick up one or two of them. Dr. Birch spoke earlier of the need for physicians to recommend an equally good environment for all children. Now, from observing graphs which show the effects of various special child care programs, I've concluded that our work is having a very strong influence. Measurements of this influence, however, have to do with diluted forms of intervention which all in all do not push disadvantaged children very far up into levels of, say, good ITPA performance. Rather, we are keeping them from falling behind. By inference, this means we are keeping the communicative parameters of their impoverished environment from exerting their normal influence. At the same time, the control group of children is falling farther behind in its performance on such tests. Now, it's a sad commentary on the state of our work that all we've managed to do is keep one group of disadvantaged children at the same level of performance while permitting another group of the same kind to remain exposed to impairing effects of their poor environment. With this comment, I turn to the question of Dr. Gordon: where are useful areas to expend money on. I don't think the present system of annual financing is going to give us an adequate answer. Right now we're so afraid that we're going to lose an economic basis for the study of the current generation of children that we dare not think of research into the next. Perhaps at the start when we were working with the first generation of children to come under our programs, the year-by-year method of financing was alright. But, now that we've got a clearer knowledge of what to expect in terms of problems and their solution, such an approach simply isn't enough. For building into our planning the possibility of continued studies of future generations, we've got to organize a more long-term finance structure.

Dr. Birch: In the face of not having unlimited resources to draw on, we may be forced to look to some intermediate possibilities which operate between single projects of intervention and more global ones. Perhaps if we were to have a program in which nutritional remediation were connected with educational remediation, and each of these with a third program, we would then have a chance to look at the simultaneous effect of these different programs, their different effects on the children and on themselves. For the first time, perhaps, we could begin to assess the contribution of different variants and forms of intervention to the whole problem of poverty.

Dr. Caldwell: It seems to me that most of the people in a position to allocate resources are really more concerned with specific so-called independent variables. Someone in HEW has said recently that the tasks for federal agencies is to make choices between possible areas for the allocating of money. In one paper he raises the question as to whether a school meal program should be enlarged in some Indian community at the expense of better health programs. This seems downright amoral to me. Both programs are good and needed, though in different respects; and somebody is demanding that there be a demonstrable relation of the greater good of one or the other program to the needs of society in general. I say it's going to be very difficult to get beyond the design phase of our work against poverty if someone is always dogging us with questions of the greater or less good for this or that segment of the population.

Dr. Richmond: I'd like to make a few remarks. A few years ago, this country passed through a series of crises, one of the more important having to do with civil rights. After the violence passed, something happened: we got anti-poverty legislation which, unfortunately, would not have come about otherwise. From this legislation came the notion of intervening on a rational developmental basis, which notion was challenging to us but which brought us men of the medical professions up against a moral crisis of sorts. We were certain of finding out what must be done, but there never was any guarantee that we'd ever see anything significant done about the true fact of poverty. Dr. Pasamanick pinpointed an instance of this crisis in saying the tragedy is that others have to be shown by way of scientific demonstration that a good environment contributes to the growth of a good person. But I think an even greater tragedy is in us not even getting to the point of making a demonstration, but falling short and struggling to decide at such a conference as this which design approach is better, which influences the greatest number, and so on. Of course, we've arrived at certain decisions already. For example, there's general consensus in our profession that physicians have to share their interest and concern for the development of the young with others outside the profession. But that consensus apparently hasn't been enough for some of our colleagues around the country. Some of these men are asking whether the time has come for us to become social strategists in the broadest sense, expanding our concern beyond the sphere of child development into larger spheres which encompass public health facilities for men and women, minimal nutrition and education programs for all, and the like. They are calling for nothing less than the setting up of a program of total intervention. Now, as I look back at the findings of this conference, I see that we can't possibly implement such a program without simultaneously multiplying the possibility of error and failure. I say this, because if we ease off in our decisions from going all out against poverty and fall back on doing fragmentary work in isolated areas, there's no guarantee that policies and practices in one area won't end up at cross-purposes to those in another area. And then what do we do; ease off further? At any rate, the moral crisis is still with us. In connection with a conference of this kind, I think it serves a vital function. Not only do its findings enter directly into the OEO, but they are also communicated to other professional groups which must share with us a concern for these dangerous times and the potentiality of a change for the better. I mention this aspect of communication because the professional organizations which we belong to are often the hardest to crack in terms of innovation. So, I think some of us must become, in effect, interpreters of the need for change and innovation, a very difficult job indeed. Dr. Helen Wortis has already touched on the different kinds of programs which have been undertaken in other countries. Now, it's good to note that, in his message on children, the President talked about the setting up of development centers for children and parents. This, I think, is a good sign. Moreover, though there's certainly a need for more information, I think the prior business right now is not the accumulating but the applying of what we already know. In connection with this priority, I'm reminded of something which the President asked recently. When figures were sent to him for incorporation into his health message to Congress, one of the figures indicated that our country was fifteenth in rate of deaths at birth. The President sent back a memo, asking in a very simple way: "How come?" Some have misinterpreted his question, saying that it indicates his total skepticism about current research. But I really think that if fairly taken this question is simply asking us why, if we've been doing research all these years with the idea that, through research sound method will be formulated for improving the health of impoverished people, why isn't this happening? A clear and cogent answer to this question is needed. And I think one of the functions of such a conference as this has been to come up with one.

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